Hazard Mitigation Plan

City of Santa Fe, New Mexico

120 S. Federal Place
Santa Fe, New Mexico 87501

Draft

Submitted to

New Mexico Department of Homeland Security & Emergency Management

September 2013

B-Sting Ventures, LLC

4109 Whistler Ave NW
Albuquerque, NM 87114

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Plan Adoption Resolutions

In accordance with Part 201.6 of the Disaster Mitigation Act of 2000 (DMA 2000), the City of Santa Fe, New Mexico has developed this Hazard Mitigation Plan to identify hazards that threaten the city and ways to reduce future damages associated with these hazards.

Following this page is the signed resolution from the city adopting this plan and authorizing municipal government staff to carry out the actions detailed herein.

Signed resolutions of adoption by all participating jurisdictions shall be inserted following this page after FEMA has reviewed and determined that the Draft plan is approvable.

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City of Santa Fe, New Mexico HMP Adoption Resolution

Placeholder for Resolution by City Officials

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Executive Summary

The City of Santa Fe, New Mexico is threatened by a number of different natural hazards. These hazards endanger the health, safety, and welfare of the City's population; jeopardize its economic vitality; and imperil the quality of its environment. To avoid or minimize vulnerability to these hazards, the New Mexico Department of Homeland Security and Emergency Management (NMDHSEM) and the Federal Emergency Management Agency (FEMA) provided support to the City of Santa Fe to undertake a hazard mitigation planning process. The resulting *Multi-Jurisdictional Hazard Mitigation Plan for Santa Fe, New Mexico* (hereinafter referred to as the "Plan") identifies and profiles those hazards that can affect the city, assesses the city's vulnerability to these hazards, and identifies alternative mitigation actions. The Plan also includes an implementation strategy for preferred mitigation actions as selected and prioritized by the Mitigation Planning Team. The City of Santa Fe, New Mexico Office of Emergency Management provided the lead in soliciting the participation from state and local agencies within the city that supported in the update of this hazard mitigation plan.

In addition, because of the diversity of interests in the city, the MPT encouraged private sector and citizens to add their voices to the planning process and the decisions that will affect their future. As a result, this document represents the work of citizens, elected and appointed government officials, business leaders, and volunteers of non-profit organizations to develop a plan that will help protect community assets, preserve the economic viability of the community, and save lives. The following summarizes the results of this effort and is organized according to the major sections of the Plan:

Introduction (Section One) – provides an overview of the city in the plan, an overall of the city's vulnerability assessment and the process towards developing the plan. The vulnerability analysis overviews the county socioeconomics, the built environment, growth and development and a list of identified public sector-owner and operated critical facilities in the city identified in this HMP. Section two provides additional vulnerability analysis for each hazard at it relates to the City of Santa Fe.

Hazard Identification and Risk Assessment (Section Two) – identifies and profiles natural hazards that can affect the City of Santa Fe, New Mexico as follows:

- Wildland fire
- Flooding
- Severe weather to include extreme cold and heat
- Drought
- Man Made hazards to include terrorism, hazmat incidents, nuclear facility accidents
- Space weather as it impacts communications

These hazards are listed in order of priority as determined by the majority of the MPT. A brief summary of the relevant issues is provided for these hazards with more detail regarding the entire list within the Plan.

- **Wildfire/Wildland Urban Interface –**Forestland in the surrounding Santa Fe County is extremely susceptible to wildfires due to dense timber stands and recent drought conditions. The higher than normal tree densities and accumulation of fuels present a significant, continued threat of wildfire to structures located in the wildland-urban interface area. Much of the City's water comes from the Santa Fe Watershed located within the forest.

- **Floods/Flash Floods -** Flash floods are aptly named: inundation can occur suddenly with high velocity stormwater flows. Although the duration of these events is usually brief, the damages can be quite severe. In the past, flash floods have affected many low-lying areas throughout Santa Fe and this is expected to continue. However, specific impacts depend on the location, duration, and quantity of rainfall and are therefore difficult to predict. Flash floods are more likely to occur in drainage ways that receive runoff from watersheds with steep slopes and narrow stream valleys. In urban areas, parking lots and other impervious surfaces that shed water rapidly can also contribute to flash floods.

- **Severe Weather (thunderstorms, hail, lightning and winter storms, extreme heat and cold)** – All communities within the county experiences some form of severe weather activity annually, based on seasonal meteorological patterns and local topographical conditions. The county is susceptible to a full range of weather conditions, including thunderstorms, lightning, hail, high winds, and winter storms/extreme cold. All areas of the county are susceptible to severe weather conditions, although local topography, such as elevation and land contours, plays a significant part in how weather affects a particular area.

- **Drought**- A drought is a period of prolonged dryness that depletes both ground and surface water. Droughts are common in New Mexico and Santa Fe. The climate in Santa Fe is arid with average annual precipitation ranges from less than 12 inches. This normally meager annual precipitation causes extended periods of scant flow in the State's rivers, and any measurable decrease in precipitation rates can create drought conditions in a relatively short period of time.

- **Hazardous Materials** Human-caused hazards include technological hazards (e.g., hazardous material releases) and terrorism. Both of these are distinct from natural hazards in that they result directly from the actions of people. The term technological hazard refers to incidents that can arise from human activities such as the manufacture, storage, transportation, and use of hazardous materials. Technological hazards are assumed to be accidental and their consequences unintended. The term terrorism, on the other hand, encompasses intentional, criminal and malicious acts involving weapons of mass destruction (WMDs), including biological, chemical, nuclear, and radiological weapons; arson, incendiary, explosive, and armed attacks; industrial sabotage and intentional hazardous material releases; and cyber-terrorism (attacks via computer). Technological and terrorism hazards are interrelated in that facilities and transportation routes that handle hazardous materials may be potential targets

- **Space Weather** -Space weather is the concept of changing environmental (weather) conditions in near-Earth space or the space from the Sun's atmosphere to the Earth's atmosphere. It is distinct from the concept of weather within the Earth's planetary atmosphere (troposphere and stratosphere). Space weather is the description of changes in the ambient plasma, magnetic fields, radiation and other matter in space. Much of space weather is driven by energy carried through interplanetary space by the solar wind from regions near the surface of the Sun and the Sun's atmosphere. Space weather conditions have been known to affect communications on earth for decades and has been identified by NOAA as a predictable threat to communications.

The Risk Assessment portrays the threats of natural hazards, the vulnerabilities of the City of Santa Fe to those hazards identified, and the consequences of hazards impacting the community. Each natural hazard identified is addressed as a threat and is identified and profiled in the Hazard Identification. The vulnerabilities to and consequences of a given hazard are addressed in the Vulnerability Analysis. Vulnerability is analyzed in terms of exposure of both population and infrastructure to each hazard. Consequences are identified as anticipated, predicted, or documented impacts caused by a given hazard when considering the vulnerability analysis and the characteristics of the hazard as outlined in its identification.

Goals, Objectives, and Alternative Mitigation Actions (Section Three) – This section of the Plan presents a series of goals and objectives to guide hazard mitigation actions. In addition, this section identifies a series of alternative mitigation actions to address these goals for the City of Santa Fe, New Mexico.

Mitigation Plan and Implementation Strategy (Section Four) – This section of the Plan identifies preferred and prioritized mitigation actions as determined by the MPT as an overall approach to reducing the Santa Fe's vulnerability to natural hazards. This section recommends specific actions and an implementation strategy including details about the organizations responsible for carrying out the action, their estimated cost, possible funding sources, and timelines for implementation.

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Acknowledgements

Throughout the plan update process, the City of Santa Fe Office of Emergency Management worked tirelessly to city agencies, private organizations and citizens to participate in every step of the mitigation process in updating this comprehensive hazard mitigation plan. A letter of invitation was sent inviting jurisdictions, departments, and agencies of the mitigation effort and requested their participation (Appendix A).

The following individuals and organizations served as members of the Santa Fe County Mitigation Planning Team or made significant contributions to the planning effort and therefore were instrumental to the development of this plan:

City of Santa Fe Environmental Services Department – Katherine Mortimorra
City of Santa Fe Office of Emergency Management – Andrew Phelps
City of Santa Fe Environmental Services Department – Cindy Padilla
City of Santa Fe Police Department – Deputy Chief W. Johnson
City of Santa Fe Police Department – Deputy Chief J Schireifl
City of Santa Fe Land Use Department – Matthew O'Reilly
City of Santa Fe Finance Department – Teresita Garcia
City of Santa Fe Police Department – Chief Ray Rael
City of Santa Fe Land Use Department – R. B. Zaxus
City of Santa Fe SOS Water District – Victor Archula
City of Santa Fe Transit Department – Steve Ainslie
City of Santa Fe Fire Department – Erik Litzenburg
City of Santa Fe Finance Department – M. Morgan
City of Santa Fe Risk Department – Barb Boltrek
City of Santa Fe Public Utilities – Brian Snyder
City of Santa Fe 911 Director – Ken Martinez
City of Santa Fe PUD – Katherine Martinez
Santa Fe Public Schools – Gabe Romero
B-Sting Ventures, LLC – Brian W. Fields
B-Sting Ventures, LLC – Lora Sedore

In addition, the records show that the following stakeholder entities participated through attending at least one meeting or responding to at least one questionnaire.

New Mexico Department of Homeland Security and Emergency Management
City of Santa Fe ARES – Don Hinsman

B-Sting Ventures, LLC (Albuquerque, NM) acted as the plan development consultant providing hazard mitigation planning services.

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Federal

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U.S. Army Corps of Engineers, District Office, Emergency Management

State

Director, Department of Homeland Security and Emergency Management

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Director, City of Santa Fe Office of Emergency Management

Director, City of Santa Fe Public Utilities Department

Director, City of Santa Fe Public Works Department

Director, City of Santa Fe Land Use Department

Chief, City of Santa Fe Fire Department

Chief, City of Santa Fe Police Department

City Manager, City of Santa Fe City Manager's Office

Superintendent, Santa Fe Public Schools

Director, Santa Fe Regional Emergency Communications Center

Emergency Coordinator, Santa Fe ARES

Emergency Manager, Santa Fe County

Emergency Manager, Rio Arriba County

Emergency Manager, Sandoval County

Emergency Manager, Los Alamos County

Emergency Manager, Bernalillo County

Emergency Manager, Torrance County

Emergency Manager, San Miguel County

Emergency Manager, Mora County

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Acronyms Used In This HMP Plan

Acronym	Term
A	
ASCE	American Society of Civil Engineers
B	
BCA	Benefit/Cost Analysis
BD/DR	Business Continuity/Disaster Recovery
BFE	Base Floodplain Elevation
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BNSF	Burlington Northern Santa Fe (Railroad)
BSV	B-Sting Ventures, LLC
BWS	Beaufort Wind Scale
C	
CBR	Cost/Benefit Review
CDBG	Community Development Block Grant
CFM	Certified Floodplain Manager
CFOI	Census of Fatal Occupational Injuries
cg	Cloud-to-Ground (lightning)
CMMS	Computerized Maintenance Management System
COE	College of Economics
CRS	Community Rating System (for NFIP)
CWPP	Community Wildfire Protection Plan
D	
DFIRM	Digital Flood Insurance Rate Map
DMA	Disaster Mitigation Act
DMA 2000	Disaster Mitigation Act of 2000
DMA2K	Disaster Mitigation Act of 2000
DOC	Department of Commerce
DOD	Department of Defense
DOI	Department of the Interior
DRMS	NSF Directorate for Social, Behavioral and Economic Science, Division of Social Behavioral and Economic Research, Decision, Risk, and Management Science Program
E	
EAP	Emergency Action Plan

EDA	Economic Development Administration
EF	Enhanced Fujita Scale
EM	Emergency Manager
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
ERC	Energy Release Component
ERP	Enterprise Resource Planning
ESRI	Economic and Social Research Institute

F

FEMA	Federal Emergency Management Agency
FDRS	Fire Danger Rating System
FHBM	Flood Hazard Boundary Map
FIMA	Federal Insurance and Mitigation Administration
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Studies
FMA	Flood Mitigation Assistance
FRCC	Fire Regime Condition Class
FWS	Fish and Wildlife Service
FY	Fiscal Year

G

GIS	Geographic Information System
GOES	Geostationary Operational Environmental Satellite
GPS	Global Positioning System
GSD	General Services Department

H

HAZUS-MH	Hazards U.S. Multi-Hazard
HIRA	Hazard Identification and Risk Assessment
HMGP	Hazard Mitigation Grant Program
HMO	Hazard Mitigation Officer
HMP	Hazard Mitigation Plan
HUD	Housing and Urban Development

I

IA	Individual Assistance
IBC	International Building Code
IFR	Interim Final Rule

J

K

KBDI	Keetch-Byram Drought Index

L

LAL	Lightning Activity Level
LOMR	Letters of Map Revision
LTER	Long Term Ecological Research

M

MHIRAM	Multi-Hazard Identification and Risk Assessment
MMI	Modified Mercalli Intensity
MPT	Mitigation Planning Team
MPH	Miles Per Hour

N

NCDC	National Climatic Data Center
NCHS	National Centers for Health Statistics
NDFD	National Digital Forecast Database
NEHRP	National Earthquake Hazard Reduction Program
NEPA	National Environmental Policy Act
NFHL	National Flood Hazard Layer
NFIP	National Flood Insurance Program
NHPA	National Historic Properties Act
NIBS	National Institute of Building Sciences
NIMS	National Incident Management System
NMDHSEM	New Mexico Department of Homeland Security and Emergency Management
NMDOT	New Mexico Department of Transportation
NMSM	New Mexico School of Mines
NMTEP	New Mexico Tech Emergency Planner
NNMCC	Northern New Mexico Community College
NPS	National Park Service
NRCS	National Resources Conservation Service
NSF	National Science Foundation
NWR	National Wildlife Refuge
NWS	National Weather Service

O

OCP	Office of Capital Projects
OEM	Office of Emergency Management

P

PA	Public Assistance
PCD	Planning and Campus Development

PCPI	Per Capita Personal Income
PDA	Preliminary Damage Assessment
PDM	Pre-Disaster Mitigation
PDSI	Palmer Drought Severity Index
PGA	Peak Ground Acceleration
PI	Principle Investigator
PNM	Public Utility Company of New Mexico
POC	Point of Contact

Q

R

RAOB	Radiosonde Observation
RGIS	Resource Geographic Information System
RH	Relative Humidity
RHS	Rural Housing Service
ROTC	Reserve Officers Training Corp
RUS	Rural Utilities Service

S

SBA	Small Business Administration
SC	Spread Component
SCMPG	City of Santa FeMitigation Planning Group
SFHA	Special Flood Hazard Area
SGH	Socorro General Hospital
SHMO	State Hazard Mitigation Officer
SRS	Safety and Risk Services
SSA	Socorro Seismic Anomaly
STAPLE+E	Social, Technical, Administrative, Political, Legal, Economic, and Environmental

T

TERA	Terminal Effects Research and Analysis
THIRA	Threat and Hazard Identification and Risk Assessment
TPI	Total Personal Income

U

USACE	US Army Corp of Engineers
USDA	US Department of Agriculture
USGS	United States Geological Survey

V

VEI	Volcanic Explosivity Index

W

WFAS	Wildland Fire Assessment System
WIPP	Waste Isolation Pilot Plant
WUI	Wildland-Urban Interface

X

Y

Z

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Definitions and Terms

Asset: Any manmade or natural feature that has value, including people; buildings; infrastructure such as bridges, roads, and sewer and water systems; lifelines such as electricity and communication resources; and environmental, cultural, or recreational features such as parks, dunes, wetlands, and landmarks.

Building: A structure that is walled, roofed, principally above ground, and permanently affixed to a site. The term also applies to a manufactured home on a permanent foundation on which the wheels and axles carry no weight.

Capability Assessment: An assessment that provides an inventory and analysis of a community or state's current capacity to address the threats associated with hazards. The capability assessment attempts to identify and evaluate existing policies, regulations, programs, and practices that positively or negatively affect the community or state's vulnerability to hazards or specific threats.

Comprehensive Plan: A document, also known as a "general plan," which covers the entire geographic area of a community and expressing community goals and objectives. The plan lays out the vision, policies, and strategies for the future of the community, including all of the physical elements that will determine the community's future development. This plan can discuss the community's desired physical development, desired rate and quantity of growth, community character, transportation services, location of growth, and citing of public facilities and transportation. In most states, the comprehensive plan has no authority in and of itself, but serves as a guide for community decision-making. Not all governmental jurisdictions maintain a plan of this type.

Comprehensive Range of Mitigation Actions: As required by the mitigation strategy, at least two distinct mitigation actions per hazard that are inclusive in nature and which relate to accomplishing the goals and objectives of the plan.

Cost-Benefit Review: An evaluation of the favorable returns that result vs. the monetary expenditures required to complete proposed mitigation actions. When prioritizing actions in a mitigation strategy, a special emphasis shall be made on this economic evaluation. *Note: The Cost-Benefit Review should not be confused with FEMA's Benefit-Cost Analysis software. Though this software can provide you with a method for this evaluation, it is not a required step for completing this prioritization.*

Critical facility: Facilities vital to the health, safety, and welfare of the population and that are especially important following hazard events. Critical facilities include, but are not limited to, shelters, police and fire stations, and hospitals.

Disaster Mitigation Act of 2000 (DMA 2000): DMA 2000 (PL 106-390) is legislation designed to improve the planning process signed into law on October 30, 2000 to amend the Stafford Act. This legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur.

Duration: How long a hazard event lasts.

Essential Facility: Elements important to ensure a full recovery of a community or state following a hazard event. These would include: government functions, major employers, banks, schools, and certain commercial establishments, such as grocery stores, hardware stores, and gas stations.

Evapotranspiration: means the total loss of water from a crop into the air. Water evaporates from any moist surface into the air unless the air is saturated. Water surfaces in contact with air, such as lakes, plant leaves, and moist soils, all evaporate water.

Extent of a Hazard: The magnitude or severity of a hazard. Not to be confused with the location or site of a hazard. The extent and damage predicted by a hazard can be established by comparing previous or predicted hazard events to established technical measures, such as the Fujita Scale for tornados. For example, a community might predict that the typical tornado that would affect them is an F2 storm, with speeds of 150 mph. The Fujita Scale predicts impacts that include "considerable damage, roofs torn off houses, mobile homes demolished, boxcars pushed over" etc. This demonstrates the extent, which is the typical magnitude and impact expected on the community.

Frequency: A measure of how often events of a particular magnitude are expected to occur. Frequency describes how often a hazard of a specific magnitude, duration, or extent typically occurs. Statistically, a hazard with a 100-year recurrence interval is expected to occur once every 100 years on average and has a 1% chance (its probability) of happening in any given year. The reliability of frequency information varies depending on the kind of hazard being considered.

Goals: General guidelines that explain what you want to achieve. They are usually broad policy-type statements, long term in nature, and represent global visions.

Governing Body: The governing body of a Tribe, County, Parish or City having legislative and administrative powers, such as passing ordinances and appropriating funds, e.g. city council, county commissioners, quorum court, policy jury, tribal council, etc.

Hazard: A source of potential danger or adverse conditions. A natural event is a hazard when it has the potential to harm people or property. Per the Section 322 of the Disaster Mitigation Act of 2000, only natural hazards are required to be assessed for mitigation planning.

Hazard Event: A specific occurrence of a particular type of hazard.

Hazard Identification: The process of identifying all the types of hazards that threaten or affect a specific planning area.

Hazard Mitigation: Sustained actions taken to reduce or eliminate long-term risk from hazards and their effects.

Hazard Mitigation Grant Program (HMGP): Authorized under Section 404 of the Stafford Act, HMGP is administered by FEMA and provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster.

Hazard Profile: It is a description of the physical characteristics of each hazard identified and a presentation of its various descriptors, including location, extent (magnitude), previous occurrences, and the probability of future events. In most cases, a community can most easily use these descriptors when they are displayed on maps.

Impact: The damage that is expected or predicted by a hazard occurring is a specific area.

Infrastructure: Public services of a community that have a direct impact on the quality of life. Infrastructure includes communication technologies (e.g., telephone lines and Internet access); vital services (e.g., public water supplies and sewer treatment facilities); transportation system components (e.g., airways, airports, and heliports); highways, (e.g., bridges, tunnels, roadbeds, overpasses, railways, rail yards, and depots); and waterways (e.g., canals, locks, seaports, ferries, harbors, dry-docks, piers, and regional dams).

Intensity: A measure of the effects of a hazard event at a particular place.

Interim Final Rule on Local Mitigation Planning (IFR): The governing regulations found in 44 CFR 201.6 which provide the criteria for completing a local hazard mitigation plan. Originally published in the Federal Register on February 26, 2002.

Inventory: The assets identified in a study region, which include buildings and infrastructure.

Location of a Hazard: The area affected by a hazard or hazard event. Some hazards are general to the whole of a planning area (thunderstorms, earthquakes) while others are very specific to known areas (flooding, landslides).

Loss Estimation: Estimation of potential losses by assigning hazard-related costs and losses to inventory data such as data for populations, building stocks, transportation and utility lines, regulated facilities, and more). Loss estimation is essential to decision-making at all levels of government and provides a basis for developing mitigation plans and policies. Loss estimation also supports planning for emergency preparedness, response, and recovery.

Magnitude: A measure of the strength of a hazard event. The magnitude (also referred to as severity) of a given hazard event is usually determined using technical measures to be specific to the hazard.

Mitigate: To cause something to become less harsh or hostile, to make less severe or painful.

Mitigation Actions: Activities or projects that help achieve the goals and objectives of a mitigation plan.

Mitigation Plan: Authorized by Section 322 of the Stafford Act, it is a document that presents a systematic evaluation of the nature and extent of an area's vulnerability to the effects of natural hazards and a description of actions to minimize future vulnerability to hazards. Note: Local Hazard Mitigation Plans must be written to meet 44 CFR Part 201.6 (Interim Final Rule on Local Mitigation Planning) and approved by FEMA for continued eligibility for FEMA mitigation grant programs.

Multi-jurisdictional Mitigation Plan: A mitigation plan that represents the participation of more than one governmental entity in its risk assessment, mitigation strategy, plan maintenance, and adoption. This is opposed to a single-jurisdictional mitigation plan which represents only one governmental entity.

Objectives: Measurable strategies or implementation steps to attain a goal. They are shorter in range and more specific than goals.

Ordinance: A term for a law or regulation adopted by a local government.

Plan Maintenance: An on-going planning function designed to maintain the reliability and accuracy of an approved mitigation plan. This process will include a method and schedule for monitoring, evaluating and updating of the plan following its approval.

Planning: The act or process of making or carrying out plans; the establishment of goals, policies and procedures for a social or economic unit.

Planning Team: A group composed of government, private sector, and individuals with a variety of skills and areas of expertise, usually appointed by a city or town manager, or chief elected official. The group finds solutions to community mitigation needs and seeks community acceptance of those solutions.

Preparedness: Actions that strengthen the capability of government, citizens, and communities to respond to disasters.

Probability: The numeric or statistical likelihood that a hazard event will occur. Theoretically, the probability of the occurrence of an event is between 0% (indicating that the event will never occur) and 100% (indicating that the event always occurs).

Public Education and Outreach: Any campaign to make the public more aware of hazard mitigation and mitigation programs, including hazard information centers, mailings, public meetings, etc.

Recovery: The actions taken by an individual or community after a catastrophic event to restore order and lifelines in a community.

Reoccurrence Interval: The time between hazard events of similar size in a given location. It is based on the probability that the given event will be equaled or exceeded in any given year.

Resolutions: Expressions of a governing body's opinion, will, or intention that can be executive or administrative in nature. Most planning documents must undergo a council resolution, which must be supported in an official vote by a majority of representatives to be adopted.

Response: The actions taken during and immediately after an event to address immediate life and safety needs and to minimize further damage to properties.

Risk: The estimated impact that a hazard event would have on people, services, facilities, and structures in a community, or the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of damage being sustained above a particular threshold as a result of a specific type of hazard event. Risk also can be expressed in terms of potential monetary losses associated with the intensity of the hazard event. In mathematical terms, Risk=Hazard x Vulnerability.

Risk Assessment: A methodology used to assess potential exposures and estimated losses associated with likely hazard events. A risk assessment process includes four steps: identifying hazards, profiling hazard events, inventorying assets, and estimating losses.

Severity: See magnitude

Stafford Act: The Robert T. Stafford Disaster Relief and Emergency Assistance Act (PL100-107) was signed into law November 23, 1988 and amended the Disaster Relief Act of 1974 (PL 93-288). The Stafford Act is the statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs. It was most recently amended with the enactment of the Disaster Mitigation Act of 2000 (PL 106-390).

STAPLE+E: A systematic evaluation and prioritization method used to assess whether existing and potential alternative mitigation actions fulfill the plan's objectives and if they are appropriate for the planning area. The method evaluates the **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic, and **E**nvironmental (STAPLEE) opportunities and constraints of implementing a particular mitigation action within the jurisdiction.

State Hazard Mitigation Officer (SHMO): The state government representative who is the primary point of contact with FEMA, other state and federal agencies, and local units of government in the planning and implementation of pre- and post-disaster mitigation activities. This position usually resides in the State Emergency Management Agency.

Strategy: A collection of actions developed to achieve the goals and objectives. In a mitigation plan, the actions are aimed at reducing or eliminating the risk that a hazard presents to a community.

Vulnerability: How exposed or susceptible to damage an asset is. Vulnerability depends on an asset's construction, its contents, and the economic value of its functions. Vulnerability of an asset may differ from one hazard to another. As well, indirect effects can often be much more widespread and damaging than direct effects of a hazard.

Vulnerability Assessment: An assessment of the extent of injury and damage that may result from a hazard event of a given intensity in a given area. The vulnerability assessment should address the impacts of hazard events on both existing and future conditions.

Section 1 – Introduction

Purpose of the Plan

Across the United States, natural disasters have led to mounting levels of casualties, injury, property damage, and disruption of business and government services. The effect on families and individuals can be enormous and damaged businesses cannot contribute to the economy. The time, money and effort in responding to and recovering from these events redirect public resources and attention from other important programs and problems.

For the City of Santa Fe, New Mexico, this experience is recent and directly felt through major events such as flash flooding, extreme cold temperatures and wildfires in northern and southwestern parts of New Mexico where the city is affected by heavy smoke and flood issues from threatening fires that have occurred close to the city. Smaller events lead to more commonplace disruptions such as flooding of bridges and roadways challenging access to those homes and businesses beyond these impasses. Some events, such as droughts and heat waves present more subtle indirect impacts to the community.

The *Hazard Mitigation Plan for the City of Santa Fe, New Mexico* is intended to serve many purposes. These include the following:

Enhance Public Awareness and Understanding – to help residents of the City better understand the natural caused hazards that threaten public health, safety, and welfare; economic vitality; and the operational capability of important institutions;

Create a Decision Tool for Management – to provide information that managers and leaders of local government, business and industry, community associations, and other key institutions and organizations need to take action to address vulnerabilities to future disasters;

Promote Compliance with State and Federal Program Requirements – to ensure that the Santa Fe community can take full advantage of state and federal grant programs, policies, and regulations that encourage or mandate that local governments develop comprehensive hazard mitigation plans;

Enhance Local Policies for Hazard Mitigation Capability – to provide the policy basis for mitigation actions that should be promulgated by participating jurisdictions to create a more disaster-resistant future; and

Inter-Jurisdictional Coordination of Mitigation-Related Programming – to ensure that proposals for mitigation initiatives are reviewed and coordinated within the city and with other jurisdictions that may be included in the initiative.

The elected and appointed officials of the City of Santa Fe, New Mexico know that mitigation actions in the form of projects and programs can become long-term, cost effective means for reducing the effects of natural hazards. The goal of mitigation is to save lives, reduce injuries, property damage and recovery times. Mitigation can reduce the enormous cost of disasters to

property owners and all levels of government. In addition, mitigation can protect critical facilities, reduce exposure to liability and minimize community disruption. Preparedness, response, and recovery measures support the concept of mitigation and may directly support identified mitigation actions.

The *City of Santa Fe, New Mexico Hazard Mitigation Plan* (the "*Plan*") utilizes a multi-agency / city department planning process to identify hazards that can affect the city and to devise mitigation strategies to reduce or eliminate the effects of those hazards. It draws upon the State Plan which provides guidance to local governments in preparing their own mitigation plans by prioritizing mitigation goals and objectives, proposing solutions to certain mitigation problems, and identifying possible funding sources for mitigation projects.

This plan has been updated and prepared in compliance with federal Disaster Mitigation Act of 2000 (DMA 2000), Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended, 42 U.S.C. 5165, and the National Flood Insurance Act of 1968, as amended, 42 U.S.C. 4001 et seq., 44 Code of Federal Regulations (CFR) Part 201. This plan identifies hazard mitigation measures intended to eliminate or reduce the effects of future disasters in and surrounding the City of Santa Fe.

DMA 2000 intends for hazard mitigation plans to remain relevant and current. Therefore, it requires that State hazard mitigation plans are updated every three years and local plans, including the City of Santa Fe, every five years. This means that the Hazard Mitigation Plan for Santa Fe uses a five-year planning horizon: it is designed to carry the city through the next five years, after which its assumptions, goals, objectives, etc. will be revisited and the plan resubmitted for approval.

This plan has been developed by the City of Santa Fe Mitigation Planning Team, with support from an outside consultant at B-Sting Ventures, LLC ("BSV," the contractor responsible for providing the Planning Committee with hazard mitigation planning support services). The Plan represents the collective efforts of city departments, elected and appointed government officials, business leaders, volunteers of non-profit organizations, local citizens and other stakeholders. This plan does not necessarily represent the views, policies, and procedures of FEMA, although all attempts have been made to comply with common mitigation policies, procedures, and methods employed throughout the city.

The City of Santa Fe will continue to comply with all applicable federal laws and statutes during the periods for which it receives grant funding, in compliance with 44 CFR 13.11(c), and will amend this plan whenever necessary to reflect changes in state or federal laws and statutes as required in 44 CFR 13.11(d). It is important to note that this document is designed as an instrument of mitigation primarily for natural disasters. Natural disasters cannot be prevented from occurring. However, over the long-term, the continued implementations of this Plan will gradually, but steadily, lessen the impacts associated with hazard events.

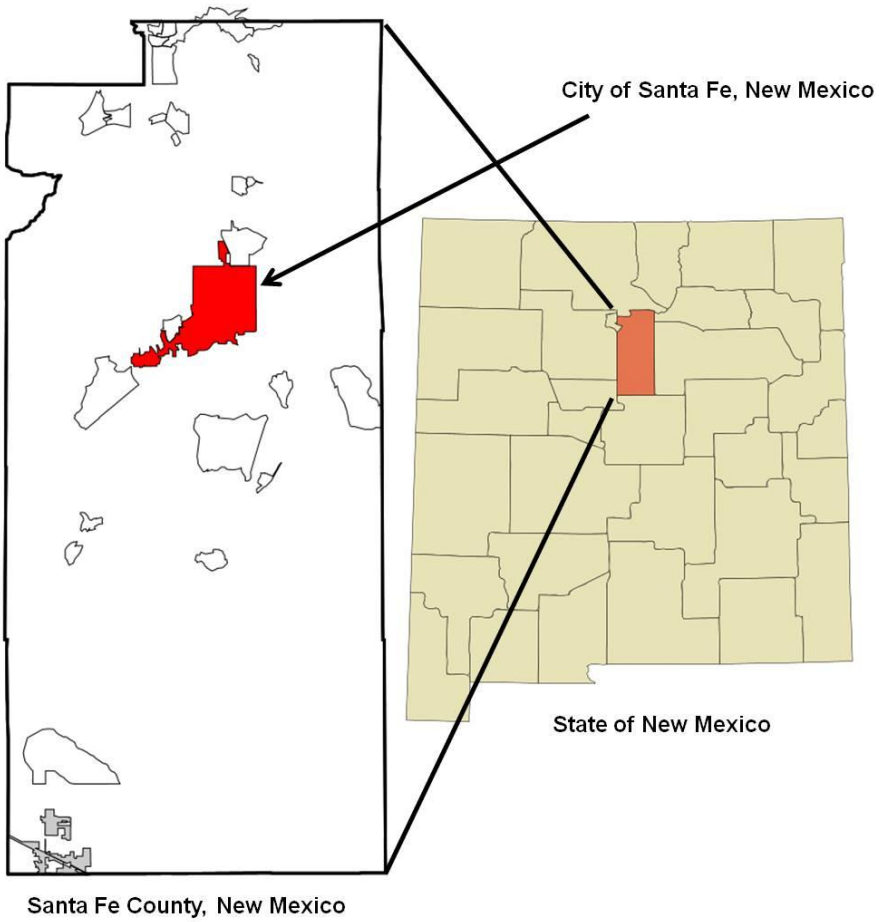
Community Background

Overview – City of Santa Fe, New Mexico

The City of Santa Fe, the largest metropolitan area in the county of Santa Fe, was established in the early 1600s and is one of the nation's oldest communities. Figure 1 shows the City of Santa Fe's location respective to the County and State of New Mexico. Figure 2 and 3 shows an overview of the City of Santa Fe, New Mexico.

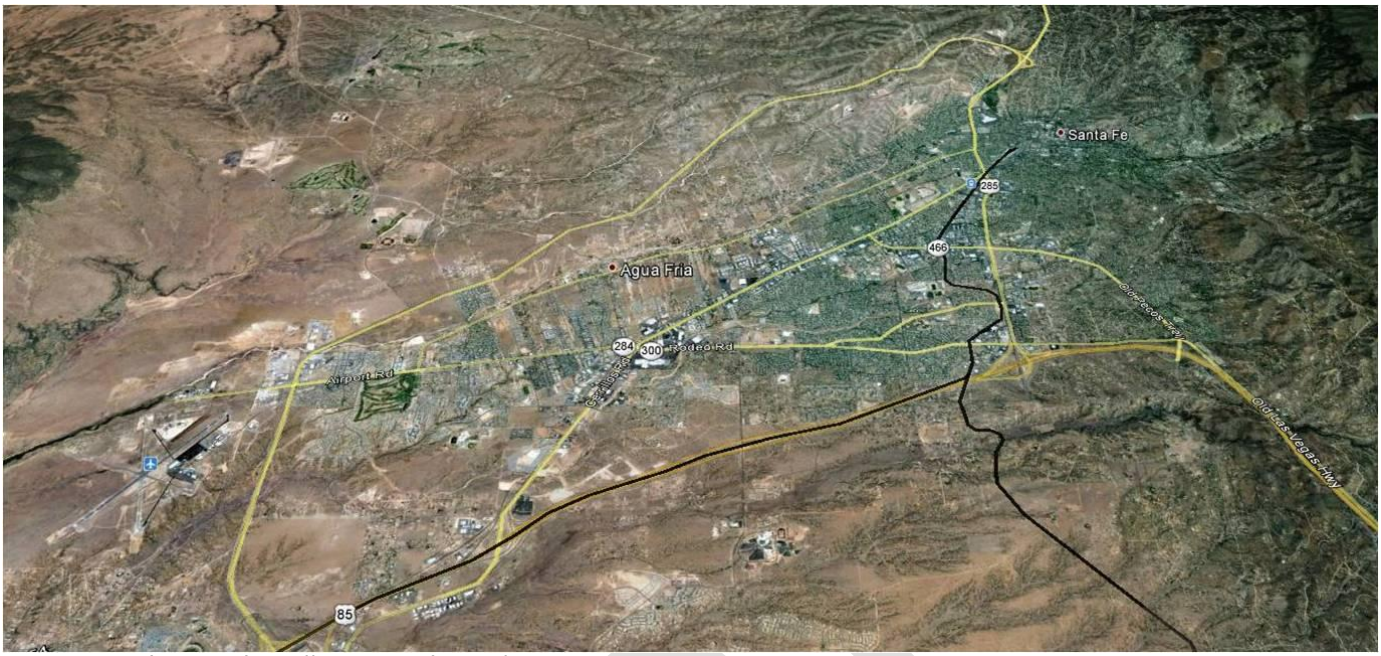
Since 1610, Santa Fe has been the capital city under four different flags: Spain, Mexico, the U.S. Confederacy, and the U.S. The historic City of Santa Fe includes centuries-old adobe and eastern-style structures and is a historic and artistic tourism Mecca. The City of Santa Fe has a diverse population of wealthy transplants as well as Indian and Hispanic populations whose heritages reach back through the centuries. Seven Native American Pueblos that include the Pueblos of San Ildefonso, Nambe, Pojoaque, Tesuque, and small sections of Santo Domingo, Santa Clara, and Cochiti Pueblos are located throughout the area.

Figure 1: Location of Santa Fe, New Mexico



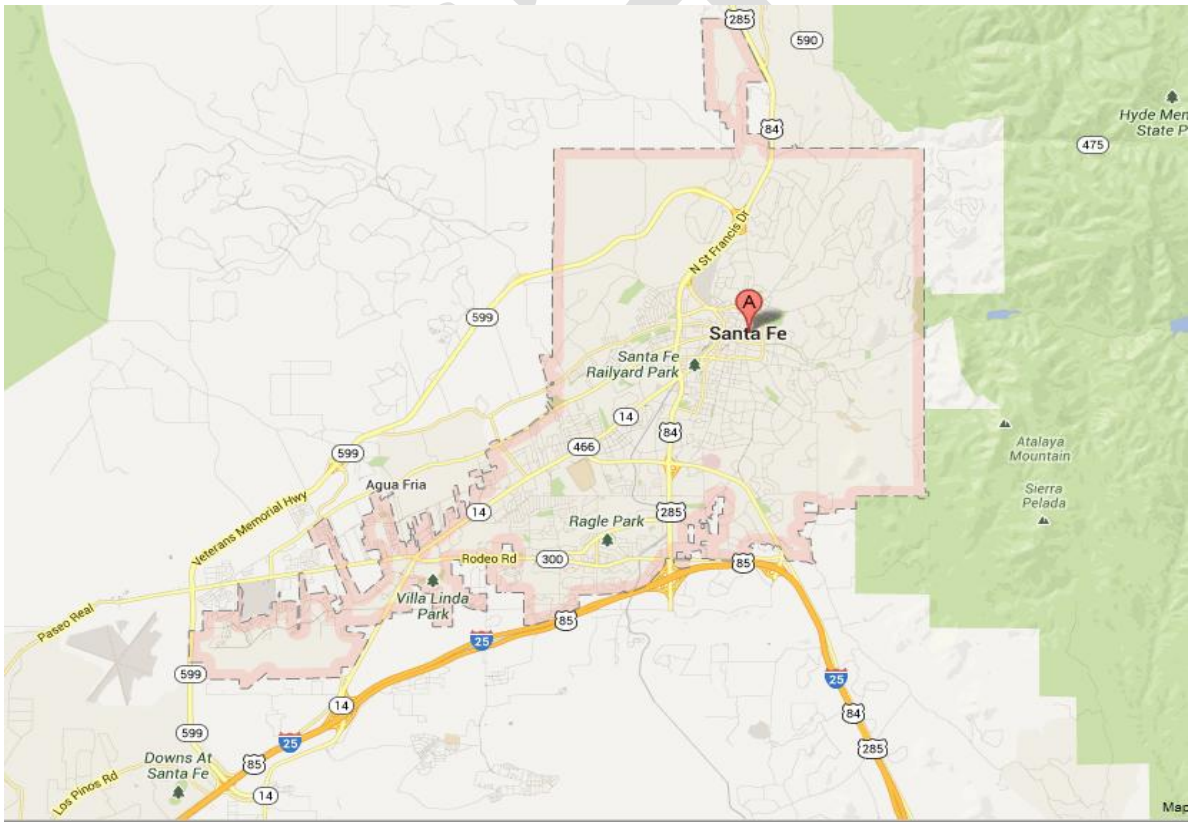
Source: http://en.wikipedia.org/wiki/Santa_Fe,_New_Mexico

Figure 2: City of Santa Fe, New Mexico



Source: Google Maps, https://maps.google.com/

Figure 3: City of Santa Fe, New Mexico



Source: Google Maps, https://maps.google.com/

City Government

The city of Santa Fe is a charter city. It is governed by a mayor-council system. The city is divided into four electoral districts, each represented by two councilors. Councilors are elected to staggered four-year terms and one councilor from each district is elected every two years. The municipal judgeship is an elected position and a requirement of the holder is that they be a member of the state bar. The judge is elected to four-year terms.

The mayor is the chief executive officer of the city and is a member of the governing body. The mayor has numerous powers and duties, but does not vote with the councilors except to break ties. Day-to-day operations of the municipality are undertaken by the city manager's office. The city manager is appointed by the Mayor and approved by the City Council and is responsible for a wide range of operations that include: All City Departments, Constituent Services, Public Information and Emergency Management.

Geographic Features

Santa Fe is located at 7,199 feet (2134 m) above sea level, making it the highest state capital in the United States.[1] According to the United States Census Bureau, the city has a total area of 37.4 square miles (96.9 km^2), of which, 37.3 square miles (96.7 km^2) of it is land and 0.1 square miles (0.2 km^2) of it (0.21%) is water.[2] As reported in the annual Santa Fe Trends 2012,by the end of 2011 the city contained 29,608 acres of land (46.3 square miles) within its corporate limits. According to Census 2010, the city has an overall population density of 1,478 persons per square mile. The city has annexed over 5,000 acres during the past five years, though many of those acres represent the city's municipal airport annexed in 2008 and I-25 in 2009, creating a new southern boundary of the city.[3]

Climate – Santa Fe belongs to the semi-arid climate zone (Köppen *BSk*),[4] with chilly winters, and hot summers. The 24-hour average temperature in the city ranges from 29.3 °F (−1.5 °C) in January to 69.8 °F (21.0 °C) in July. Evenings are much cooler than afternoons due to the aridity and elevation, with most days of the year averaging above a 30 °F (17 °C) difference between the high and low. Snowfall is typically light, and due to the high elevation and low latitude, snow does not linger on the ground for long. The city usually receives 6 to 8 snowfalls a year between November and April. Heaviest rainfall occurs in July and August, with the arrival of the North American Monsoon.[5]

Hydrology – Three major watersheds are present in the County that affect the City of Santa Fe. The Rio Grande/Santa Fe River Watershed covers most of the County, including the Rio Grande and Espanola Basins, as well as the west flank of the Sangre de Cristo Mountains and the Sandia Mountains. The Rio Pecos watershed is located in the eastern portion of the County on the southern and eastern flanks of the Sangre de Cristo Mountains. The Estancia Basin

[1] http://www.usgs.gov/
[2] http://quickfacts.census.gov/qf/states/35/3570500.html
[3] Santa Fe Trends Report http://www.santafenm.gov/DocumentCenter/Home/View/10468
[4] http://en.wikipedia.org/wiki/K%C3%B6ppen_climate_classification
[5] http://en.wikipedia.org/wiki/Santa_Fe,_New_Mexico

Watershed is a closed basin, having no surface water drainage outlet; this watershed is located in the southern portion of the County.

Natural Resources – The City of Santa Fe and the surrounding area is located within areas of forests, grasslands, and rivers of northern New Mexico. The watersheds and surrounding mountains contain conifer forests including species of Douglas fir *(Pseudotsuga menziesii),* Englemann Spruce *(Picea engelmannii)* and White Fir *(Abies concolor)* at the highest elevations. As elevation decreases, mixed conifer forests (including aspen *(Populus tremuloides)* forests) become prominent. Ponderosa Pine *(Pinus ponderosa)* and Gambel Oak *(Quercus gambelii)* forests become predominant at elevations of approximately 8500 to 7500 feet. As the elevation continues to decrease, Pinyon *(Pinus edulis)* and juniper *(Juniperus monosperma)* woodlands and juniper grasslands blend into high elevation deserts at elevations ranging from 7500 to 6500 feet.

Santa Fe, New Mexico Demographics

Population – As of the 2010 census, there were 67,947 people residing in the city (Table 1).

Table 1: City of Santa Fe, New Mexico Population by Decades

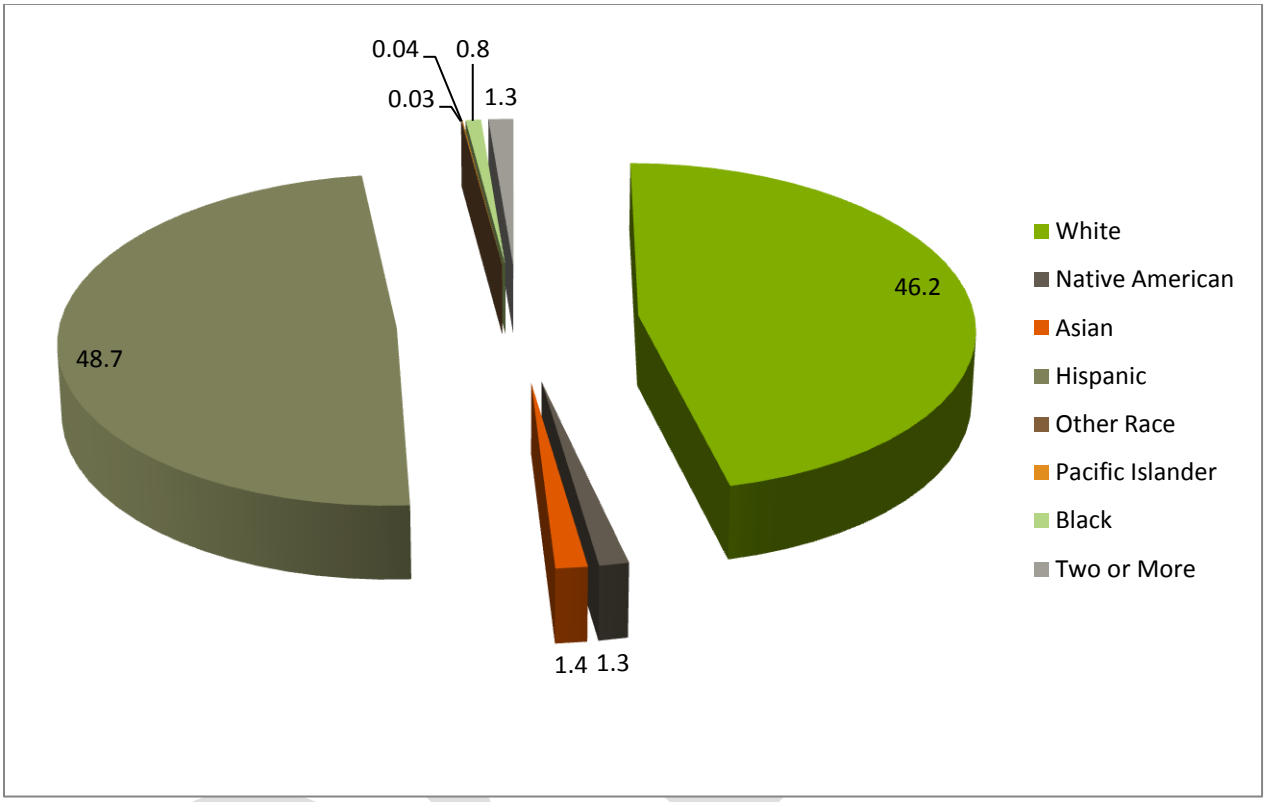
Census	Population	%±
1850	4,846	—
1860	4,635	−4.4%
1870	4,756	2.6%
1880	6,635	39.5%
1890	6,185	−6.8%
1900	5,603	−9.4%
1910	5,073	−9.5%
1920	7,326	44.4%
1930	11,176	52.6%
1940	20,325	81.9%
1950	27,998	37.8%
1960	34,394	22.8%
1970	41,167	19.7%
1980	48,053	16.7%
1990	52,303	8.8%
2000	61,109	16.8%
2010	67,947	11.2%

Source: U.S. Bureau of Census

The racial makeup of the city residents was 46.2% White; 1.3% Native American; 1.4% Asian; 48.7% Hispanic; 1.3% Two or more races; 0.8% Black alone; 0.3% Other Race alone; and

0.04% Native Hawaiian and Other Pacific Islander alone.[6] Figure 4 outlines the City of Santa Fe's racial makeup.

Figure 4: City of Santa Fe, New Mexico Racial Makeup



Source: 2010 US Census

As of the census of 2010[7] there were 67,947 people, 37,200 households, and 27,211 families living in the city. The population density was 1,666.1 people per square mile (643.4/km^2). There were 30,533 housing units at an average density of 817.8 per square mile (315.8/km^2).

There were 27,569 households out of which 24.1% had children under the age of 18 living with them, 37.6% were married couples living together, 12.1% had a female householder with no husband present, and 45.7% were non-families. 36.4% of all households were made up of individuals living alone and 10.2% had someone living alone who was 65 years of age or older. The average household size was 2.20 and the average family size was 2.90.

The age distribution was 20.3% under 18, 8.9% from 18 to 24, 29.0% from 25 to 44, 28.0% from 45 to 64, and 13.9% who were 65 or older. The median age was 40 years. For every 100 females there were 91.7 males. For every 100 females age 18 and over, there were 89.0 males.

[6] Santa Fe (city), New Mexico". *State & County QuickFacts*. U.S. Census Bureau. http://quickfacts.census.gov/qfd/states/35/3570500.html and http://www.city-data.com/city/Santa-Fe-New-Mexico.html

[7] American FactFinder". United States Census Bureau. http://factfinder.census.gov. Retrieved 2008-01-31.

The median income for a household in the city was $40,392, and the median income for a family was $49,705. Males had a median income of $32,373 versus $27,431 for females. The per capita income for the city was $25,454. About 9.5% of families and 12.3% of the population were below the poverty line, including 17.2% of those under age 18 and 9.2% of those age 65 or over. Table 2 provides an overview of the City of Santa Fe population and the Santa Fe County.

Table 2: New Mexico Population by Jurisdiction

Santa Fe, New Mexico			
County	**Population**	**City**	**Population:**
Santa Fe	144,168	**Santa Fe**	**67,947**

Source: 2010 US Census

Based on the 2010 Census information for the county and city, Santa Fe makes up 47% of the total population for the county. Table 3 shows projected populations for the state, Santa Fe County and the City of Santa population until 2040. Projected populations for the state and county are based on the UNM Bureau of Business & Economic Research (BBER) Geospatial and Population Studies Group (GPS) and the City of Santa Fe projections are based on a 0.9% annual increase between 2000 – 2010, as reported in the City of Santa Fe's annual report titled "*Santa Fe Trends 2012*".[8]

Table 3: City of Santa Fe Projected Populations (1950 - 2030)

	As of July 1…						
Location	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
New Mexico	2,065,826	2,208,450	2,351,724	2,487,227	2,613,332	2,727,118	2,827,692
Santa Fe County	144,532	154,756	164,006	171,905	178,124	182,410	184,832
City of Santa Fe	67,9476	68,253	68,321	68,389	68,458	68,526	68,594

Source: Bureau of Business and Economic Research, University Of New Mexico; http://bber.unm.edu/demo/PopProjTable1.htm and Santa Fe Trends 2012, Santa Fe Trends Report http://www.santafenm.gov/DocumentCenter/Home/View/10468

Note: City of Santa Fe projected populations based on a 0.9% annual increase in population, multiplied by 5 years and applied to each 5-year date projection.

Santa Fe, New Mexico Economy

Employment and Income – Santa Fe's economy has been based largely on tourism and state government, as it's the capitol of New Mexico and the government is the largest employer in the area. In 2011, wage & salary jobs in the private sector employed 45,000 in the County, while 16,300 individuals were employed in the public sector. Employment by leading sectors included:

[8] Santa Fe Trends Report http://www.santafenm.gov/DocumentCenter/Home/View/10468

- Government (fed., state, local) – 16,300 (22%)
- Health Care/Social Assistance – 9,300 (13%)
- Retail – 9,000 (12%)
- Accommodations/Food Service – 7,800 (11%)
- Construction – 2,800 (4%)

Per Capita Personal Income – In 2010, the City of Santa Fe had a per capita personal income (PCPI) of $25,454 and ranked 18th in the State of New Mexico.[9]

Utilities

- Electric services are provided by the PNM.
- Natural gas service provided by new Mexico Gas Company
- Telephone and High Speed Internet provided by Qwest
- High-Speed Internet provided by Cyber Mesa
- Telephone, High-Speed Internet and Cable Television provided by Comcast
- Wireless Telephone provided by numerous carriers

Water and Wastewater – The Public Utilities Department is responsible for efficiently managing water, wastewater, solid waste and fire protection services that will ensure the delivery of high quality and reliable services in the City of Santa Fe.

Solid Waste Management – The Santa Fe Solid Waste Management Agency operates Caja del Rio Landfill and Buckman Road Recycling & Transfer Station (BuRRT). The Agency works with the City of Santa Fe and Santa Fe County to help Santa Fe rethink their waste and reduce the impact on our environment. The Santa Fe Solid Waste Management Agency (SFSWMA) was formed in 1995, under the terms of the New Mexico Joint Powers Agreements Act, NMSA 1978 Sections 11-1-1- through 11-1-7, by a Joint Powers Agreement executed by the City of Santa Fe and the County of Santa Fe, New Mexico. The Agreement delegated the Agency the power to plan for, operate, construct, maintain, repair, replace or expand the Caja del Rio Landfill and ultimately the Buckman Road Recycling & Transfer Station (BuRRT).[10]

Tourism – Tourism is a major element of the Santa Fe economy, with visitors attracted year-round by the climate and related outdoor activities (such as skiing in years of adequate snowfall; hiking in other seasons) plus cultural activities of the city and the region. Most tourist activity takes place in the historic downtown, especially on and around the Plaza, a one-block square adjacent to the Palace of the Governors, the original seat of New Mexico's territorial government since the time of Spanish colonization. Other areas include “Museum Hill”, the site of the major art museums of the city as well as the Santa Fe International Folk Art Market, which takes place each year during the second full weekend of July. The Canyon Road arts area with its galleries is also a major attraction for locals and visitors alike.

[9] http://en.wikipedia.org/wiki/New_Mexico_locations_by_per_capita_income
[10] http://www.sfswma.org/about-us/

Air/Rail Transportation Routes – The Albuquerque International Sunport provides most air service to Santa Fe. However, the Santa Fe municipal airport, located in the southwest corner of the city, is serviced by commuter airline connections, and private aircraft provides air access to the community. Passenger trains and freight trains pass through the middle portion of the County. Amtraks Southwest Chief trains eastbound from Los Angeles and westbound from Chicago meet daily in Lamy, New Mexico (20 miles south of Santa Fe).

Vehicular Transportation Routes – Interstate 25 bisects the City of Santa Fe on its northern route from Albuquerque to Denver, Colorado. US 285/84 connects Santa Fe to the northern communities of Tesuque, Nambe, and Pojoaque. US 285/84 also provides access to Los Alamos via NM 501.

Public Transportation – Santa Fe Trails operates a number of bus routes within the city and also provides connections to regional transit. New Mexico Park and Ride, a division of the New Mexico Department of Transportation, and the North Central Regional Transit District operate primarily weekday commuter coach/bus service to Santa Fe from Torrance, Rio Arriba, Taos, San Miguel and Los Alamos Counties in addition to shuttle services within Santa Fe connecting major government activity centers.

Education – The Santa Fe Public Schools system is the third largest district in the state of New Mexico. It is administered by a five-member, nonpartisan board of education that establishes educational policies and appoints a superintendent. The public schools in Santa Fe are operated by Santa Fe Public Schools and have three major High Schools, four junior high schools and 20 elementary schools.

The City has three private liberal arts colleges: St. John's College, Santa Fe University of Art and Design (formerly the College of Santa Fe), and Southwestern College; plus Santa Fe Community College and the Institute of American Indian Arts.

The City has six private college preparatory high schools: Santa Fe Waldorf School, St. Michael's High School, Desert Academy, New Mexico School for The Deaf, Santa Fe Secondary School, and Santa Fe Preparatory School. Santa Fe is home to the Santa Fe Indian School, an off-reservation school for Native Americans. There are also several charter schools, including Monte Del Sol, the Academy for Technology and the Classics and Tierra Encantada Charter High School. The city has many private elementary schools as well, including Little Earth, Santa Fe International Elementary School, Rio Grande School, Desert Montessori School, La Mariposa Montessori, Santa Fe School for the Arts, and The Tara School. The Academy for the Love of Learning is located in southeast Santa Fe.[11]

[11] http://en.wikipedia.org/wiki/Santa_Fe,_New_Mexico#Government

Summary of Changes – 2013 City Hazard Mitigation Plan

City of Santa Fe HMP Changes

The City of Santa Fe Hazard Mitigation Plan previously approved by FEMA in 2008, must be updated every five years. This Plan Update will demonstrate the City and participating agency's commitment to reducing risk and serve as a guide for decision makers as they commit resources to minimize the effects of natural hazards

The planning process for the 2013 Mitigation Plan Update began in November 2012 when a working group was formed and for the next 10 months the group met to review and update the plan. Copies of the agenda and meeting summaries are located in Appendix A.

The 2013 update builds on the 2008 Hazard Mitigation Plan and many areas, specifically, the 2013 update includes:

- Adding the Hazard Mitigation Plan Distribution List
- Adding a list of Acronyms and Definition and Terms sections at the beginning of the document
- Updated and enhanced Community Background (Section 1)
- Added Critical Facilities Inventory to include estimated values (Section 1)
- More extensive profiling of all hazards including the use of standardized subsections and updating of previous events/data through 2012 (Section 2)
- Removal of earthquakes; and other hazards to include landslides, land subsidence, dam failure and volcanoes in the mitigation plan data as the City is not susceptible to these hazards (Section 2)
- Analysis and roll-up risk assessment information (damage/loss information, hazard prioritization) (Section 2)
- Summary of Hazard Investigation (Section 2)

Plan Development Process

City of Santa Fe, New Mexico Approach

The City of Santa Fe, New Mexico took a multi-agency approach to update this hazard mitigation plan. To undertake such multi-agency approach, each agency needed to involve its senior leaders to since they have the legal authority to enforce compliance with land use planning and development issues. Each agency, listed in Table 4, provided some type of resource (i.e., funding, data, Geographic Information System (GIS), etc.) to support the update of this hazard mitigation plan. At the beginning of the project, the City retained the services of a consultant (B-Sting Ventures, LLC) to guide the MPT through the process and author the plan.

Table 4: HMP Update Agency Participants

City of Santa Fe Agency Participants	
City of Santa Fe Environmental Services Department	City of Santa Fe Finance Department
City of Santa Fe Office of Emergency Management	City of Santa Fe Risk Department
City of Santa Fe Police Department	City of Santa Fe Public Utilities
City of Santa Fe Land Use Department	City of Santa Fe 911 Director
City of Santa Fe Finance Department	City of Santa Fe PUD
City of Santa Fe Land Use Department	Santa Fe Public Schools
City of Santa Fe SOS Water District	NM Department of Homeland Security & Emergency Management
City of Santa Fe Transit Department	B-Sting Ventures, LLC

Throughout the plan update process, the Santa Fe Emergency Manager (EM) worked tirelessly to involve city agencies, private sector and local citizens. These agencies were not only invited to participate but were truly guided through the entire phased process. A letter of invitation was sent inviting city agencies/departments, private sector and citizens to participate in the mitigation update (Appendix A).

Hazard Mitigation Plan Funding

The Robert T. Stafford Act, Section 404, allows the Federal Emergency Management Agency (FEMA) to provide hazard mitigation assistance. The Disaster Mitigation Act of 2000 amended

the Stafford Act to require communities to have a Hazard Mitigation Plan approved in order to receive funding assistance from FEMA. To facilitate the development and/or update of Hazard Mitigation Plans, FEMA established the Hazard Mitigation Grant Program (HMGP). Funding for updating the City of Santa Fe's Hazard Mitigation Plan was provided by grant through the Federal Emergency Management Agency and funding the New Mexico Department of Homeland Security and Emergency Management. This grant funding was provided to establish the City's long-term strategy for reducing its risks from natural hazards. City of Santa Fe Office of Emergency Management was the recipient of the funding for coordinating planning and update of the hazard mitigation plan.

Plan Preparation

The City of Santa Fe's Hazard Mitigation Plan is a collaborative effort of the work of many people who comprise the Santa Fe Mitigation Planning Team (MPT). The MPT retained the services of B-Sting Ventures, LLC (the contractor) in November 2012 to support the planning process and produce the updated plan. The MPT addressed specific topics related to the development of the Hazard Mitigation Plan at scheduled meetings. Between meetings, members provided information to the Santa Fe EM.

Upon formation of the MPT, a meeting was held to discuss the content of the plan. A letter of invitation was sent requesting participation from various city agencies, private sector, local citizens, tribal, state, and federal departments and agencies (Appendix A). The approach taken by Santa Fe relied on sound planning concepts and a methodical process to identify City vulnerabilities and to propose the mitigation actions necessary to avoid or reduce those vulnerabilities. Each step in the planning process built upon the previous, providing a high level of assurance that the mitigation actions proposed by the participants and the priorities of implementation are valid. Specific steps in the process included:

Hazard Mitigation Plan Update Kickoff Meeting

A kickoff meeting occurred on November 28, 2012 at 9:00 a.m. at the City's Office of Emergency Management Conference Room. This meeting was attended by key city agency officials who were essential in helping this project move forward. The City's EM introduced the contractor hired to assist in the update and meeting task requirements. The contractor provided an overview of what mitigation planning is and the required involvement of agencies at all levels. The contractor stressed the importance of data collection and allowing for the opportunity to bring in key stakeholders who have essential data elements for inclusion and allowing the public the opportunity to be involved throughout the process. This meeting led to the project initiation meeting a few weeks later that started the project of updating the HMP.

Project Initiation

At the start of the mitigation planning process the EM, made presentations about the Plan update to City agencies during their weekly meetings and solicited support during the HMP update. Santa Fe OEM conducted a kick-off meeting on December 10, 2012 at 10:00 a.m. at Community Convention Center located at 201 W. Marcy Avenue Santa Fe, NM. This meeting

identified the purpose of mitigation planning, the importance of public input during plan development, how the plan will enable the city to seek federal funding for hazard mitigation projects and what is required from each jurisdiction to successfully develop the mitigation plan. At this meeting a series of additional meetings were established to begin the HMP update and discuss those topics that are required review and updating the plan. Meetings times and locations included:

- January 23, 2013 at the Community Convention Center
- February 26, 2013 at the Community Convention Center
- March 26, 2013 at the Community Convention Center
- May 9, 2013 at the Community Convention Center

At the December 10, 2012 the MPT began working on updating the HMP. Meetings were held with the MPT and assignments were made to the members for gathering data, taking photos, constructing data on past hazards and conducting meetings City agencies/departments. In an effort to include local citizens in the HMP update process, the Santa FE EM, with guidance from the contractor, developed a website where citizens could go out and provide their feedback on natural hazards in their community. Appendix B provides an overview of the hazard assessment that was available for citizens. Additionally, the Santa Fe EM advertised this hazard assessment and encouraged maximum participation from City agencies/departments to review and fill out the assessment and provide input in the update process.

Appendix A contains copies of meeting minutes and attendees for each meeting scheduled. Appendix B provides an overview of responses to questionnaires and additional information from the MPT on determining which natural hazards rank highest in the county. In addition, the DHSEM State Hazard Mitigation Officer (SHMO) attended the kickoff meeting to assist in mitigation planning and provide any additional support in developing the hazard mitigation plan.

During plan development, the contractor sent sections of the HMP to the Santa Fe EM, who disseminated the information to MPT members for review. All members of the MPT were kept informed by personal meetings, email or telephone. Their input was shared with the MPT members through discussion at MPT meetings, email, telephone and through personal contact. The MPT members then submitted revisions or additional details. The Santa Fe EM then presented the revisions to the contractor, who incorporated them into the plan.

The contractor assembled the final draft of the plan for distribution to MPT members for review on July 24, 2013 with comments due to the Santa Fe EM and BSV no later than August 14, 2013. A complete "final" draft was sent to NMDHSEM for review in XXXXXX, 2013. The plan was provided to FEMA for review on [insert date]. Once the plan is approved, the HMP will be adopted by the city identified in this Plan. The Disaster Mitigation Act (DMA) of 2000 (DMA2K) stipulates the minimum content of all local hazard mitigation plans. The City of Santa Fe Hazard Mitigation Plan meets or exceeds the required content for a "standard" local hazard mitigation plan. The MPT developed the content of the Plan using the following step-by-step process to collect information, compile the plan, and review.

Hazard Identification and Risk Assessment – The MPT reviewed hazards identified in their current plan and reevaluated hazards to determine if the threat still exists, changed in severity and risk and if any other hazards not identified warrant the need to be included in the HMP update. Where possible, specific geographic areas subject to the impacts of the identified hazards were mapped using GIS. The MPT considered the probability of a hazard occurring in an area and its impact on public health and safety, property, the economy, and the environment.

The MPT had access to information and resources regarding hazard identification and risk estimation, although the level of detail varied among the participating agencies. Planning team members representing agencies provided hazard specific maps, such as floodplain delineation maps, whenever possible and performed GIS-based analyses of hazard areas and the location of infrastructure, critical facilities, and other properties located within the city. The MPT also conducted a methodical, qualitative examination of the vulnerability of important facilities, systems, and neighborhoods to the impacts of future disasters. The GIS data was used to identify specific vulnerabilities that could be addressed by specific mitigation actions. The MPT also reviewed the history of disasters in the City and assessed the need for specific mitigation actions based on the type and location of damage caused by past events.

Finally, the assessment of community vulnerabilities included a review of existing codes, plans, policies, programs, and regulations used by city agencies to see if existing provisions and requirements adequately address the hazards that pose the greatest risk to the community. If needed, the participating agency can now revise existing codes or develop additional codes, plans, or policies that encourage development outside of hazard areas.

Goals, Objectives, and Alternative Mitigation Actions – Based on this understanding of the problems faced by the city, a series of goals and objectives were identified by the MPT to guide subsequent planning activities. In addition, a series of alternative mitigation actions were identified to address these goals and objectives.

Mitigation Plan and Implementation Strategy – The MPT met on March 26, 2013 to determine the priorities for actions from among the alternatives and develop a specific implementation strategy including details about the organizations responsible for carrying out the action, their estimated cost, possible funding sources, and timelines for implementation. Three additional areas are important to note regarding the planning process: Community Participation, Public Involvement, and Regulatory Compliance.

Community Participation – As noted, the Santa Fe EM provide many opportunities for bringing the community into the HMP update process. All meeting agendas were posted on the City's website at a minimum 30 days prior to a schedule meeting. Minutes and the presentations from each meeting were posted on the website with a contract number for the Santa Fe EM should the public have questions or wanted to provide any additional input from the meeting. Opportunities were also provided for interested parties and communities to review and comment on the work-in-progress for the Plan.

Public Involvement – The MPT conducted a series of public involvement initiatives to educate stakeholders about their risks, involve them in identifying issues, and educate them about mitigation options available to them. The initiatives included:

- Public Response Questionnaires to develop lists of potential mitigation actions by soliciting community input regarding vulnerabilities and potential solutions. Citizens were invited to participate by prioritizing the hazards and suggesting possible solutions, which formed the basis for researching alternatives and developing evaluation criteria for selecting mitigation actions. Questionnaires were distributed agency/department offices for distribution within each community.
- Press Releases to announce the availability of the updated Draft Hazard Mitigation Plan for public review and comment (see Appendix A for copies of public notices). Press releases were printed in the local newspaper.
- Presentations to the City of Santa Fe Council for the Final versions of the Plan informing them of proposed mitigation actions and their implementation schedule, and seeking support for adopting the Plan.
- Presentations to the public to provide an overview on mitigation and the efforts undertaken to update the plan. This also provided an opportunity for the public to provide any additional comments or suggestions for the updated plan.

Regulatory Compliance – To qualify for certain forms of federal aid for pre- and post-disaster funding, local jurisdictions must comply with the federal Disaster Mitigation Act of 2000 (DMA 2000) and its implementing regulations (44 CFR Section 201.6, published February 26, 2002). DMA 2000 intends for hazard mitigation plans to remain relevant and current. Therefore, it requires that State hazard mitigation plans are updated every three years and local plans, including the City of Santa Fe, every five years. This means that the Hazard Mitigation Plan for Santa Fe, New Mexico uses a five year planning horizon that is designed to carry the City through the next five years, after which its assumptions, goals, objectives, etc. will be revisited and the plan resubmitted for approval

Mitigation Planning Participants – The members of the MPT and other subject matter experts who were consulted in the planning process brought to the table a wide variety of experience not necessarily related to their current jobs. Their institutional knowledge, along with the specific program experience of their current job positions, made all participants in the planning process uniquely qualified to assist the mitigation planning effort. These people, agencies, and interested groups participated by attending meetings, sharing information by email, and contributing general and specific information as needed. A list of the City of Santa Fe MPT members is provided in Table 5. The Santa Fe EM and contractor coordinated the formation of this plan.

Table 5: City of Santa Fe Mitigation Planning Team

Mitigation Planning Team				
Name	**Organization**	**Phone**	**Email**	**Contribution**
Andrew Phelps	City of Santa Fe Office of Emergency Management	505-955-6537	ajphelps@santafenm.gov	Project Manager - arranged for meetings, provided documents to stakeholders, provided background hazard history and updated mitigation website.
Barb Boltrek	City of Santa Fe Risk Management	505-955-5627	bcboltrek@santafenm.gov	Provided hazard history, identified mitigation goals and actions for the plan.
Brian Snyder	City of Santa Fe Public Utilities Department	505-955-4201	bksnyder@santafenm.gov	Provided data related to water utilities and critical facilities and identified mitigation goals for inclusion in the HMP update.
R B Zaxus	City of Santa Fe Public Utilities Department	505-955-6641	rbzaxus@santafenm.gov	Provided data related to water utilities and critical facilities and identified mitigation goals for inclusion in the HMP update.
Victor Archuleta	City of Santa Fe	505-955-4370	vmarchuleta@santafenm.gov	Provided data related to water utilities and critical facilities and identified mitigation goals for inclusion in the HMP update.
Katherine Mortimer	City of Santa Fe Sustainability Department	505-955-2262	kemortimer@santafenm.gov	Provided information related to the city's sustainability project for inclusion in the HMP update.
Louise Pape	City of Santa Fe Sustainability Department	505-471-3331	louisepape@aol.com	Provided information related to the city's sustainability project for inclusion in the HMP update.
Matthew O'Reilly	City of Santa Fe Land Use Department	505-955-6617	moreilly@santafenm.gov	Provided information on land use relative to mitigation planning.
Chief Ray Rael	City of Santa Fe Police Department	505-955-5010	pjrael@santafenm.gov	Provided information on past hazard disasters and input on goals and actions for the plan.
Dep. Chief J. Schaerfl	City of Santa Fe Police Department	505-955-5010	jwschaerfl@santafenm.gov	Provided information on past hazard disasters and input on goals and actions for the plan.
W. Johnson	City of Santa Fe Police Department	505-955-5010	wijohnson@santafenm.gov	Provided information on past hazard disasters and input on goals and actions for the plan.
Don Hinsman	City of Santa Fe ARES and Citizen	505-814-8520	dhinsman@gmail.com	Provided information related to weather (retired NWS) and information related to communications for the space weather section.

Mitigation Planning Team				
Name	**Organization**	**Phone**	**Email**	**Contribution**
Ken Martinez	City of Santa Fe 911	505-992-3096	krmartinez@santafenm.gov	Provided information on communications outages as related to space weather and identified mitigation goals and actions for the plan.
Erik Litzenberg	City of Santa Fe Fire Department	505-955-3110	ejlitzenberg@santafenm.gov	Provided data related to past fire histories, identified critical facilities and identified mitigation goals and actions for the HMP update.
Cindy Padilla	City of Santa Fe Environmental Department	505-955-2209	crpadilla@santafenm.gov	Provided information on environmental issues due to past hazards occurrences. Identified goals and actions for the HMP update.
Steve Ainslie	City of Santa Fe Transit Department	505-955-2005	scainslie@santafenm.gov	Provided information to past hazards experienced in the city from natural hazards. Identified goals and actions for the HMP update.
Teresita Garcia	City of Santa Fe Finance Department	505-955-6532	tmgarcia@santafenm.gov	Identified goals and actions for the HMP update.
M Morgan	City of Santa Fe Finance Department	505-955-6530	mlmorgan@santafenm.gov	Identified goals and actions for the HMP update.
Gabe Romero	City of Santa Fe Public Schools	505-467-3440	gromero@sfps.info	Provided information on past hazards experience and information on the public schools. Identified goals and actions for the HMP update.

The City of Santa Fe OEM kept agencies and subject matter experts that did not participate with the MPT on a regular basis informed of the status and content of the plan. They will receive copies of the approved plan soon after it is approved in order for them to comment and correct errors and omissions for future updates. The City's Emergency Manager will continue to expand the list of interested parties as opportunities arise and will send to them copies of the plan and invite their participation. In addition, the plan will be available on the city website.

The City of Santa Fe HMP endorses the efforts of other local, state, and federal, agencies in addressing mitigation issues for specific hazards in their own strategic and operational plans, procedures, and regulations. The Santa Fe EM will continue to ask MPT members and other subject matter experts to provide input related to their specific agency plans, procedures, and regulations. Subsequent meetings of the MPT will discuss and possibly incorporate specific recommendations into future updates of the plan.

Section 2 – Hazard Identification / Risk Assessment

Overview

Section Two: Hazard Identification/Risk Assessment summarizes the results of the first fundamental task in the planning process wherein hazards that may affect the City of Santa Fe are identified, profiled, and their potential effects quantified. It describes previous occurrences, physical characteristics, the likelihood of future occurrence, and the potential severity of an occurrence. The steps in the process include:

- ✓ *Hazard Identification* - investigates the existence of certain types of natural and human caused conditions in and around the City. Hazards that have harmed the City in the past are likely to happen in the future. Consequently, the hazard identification process begins with determining whether or not the hazard has occurred previously. In addition, a variety of sources were used to determine the possibility of other hazards in Santa Fe that may have occurred in recent history.

- ✓ *Hazard Profiles* - determine the frequency or probability of future events, their severity, and factors that may exacerbate their severity. The Mitigation Planning Team and hazard mitigation planners used GIS software available through the City of Santa Fe Planning Department to further investigate the possible implications of a range of hazards. The data sets used to generate the assessment sometimes lacked sufficient data. In those cases, hazard probabilities and severities identified in this document are discussed in broad terms, reflecting the lack of available detailed information. These data limitations are discussed in the appropriate sections.

- ✓ *Vulnerability Assessment* - uses the information generated in the hazard identification and profiles to identify locations where Santa Fe residents could suffer the greatest injury or property damage in the event of a disaster. The vulnerability assessment process identified the effects of natural hazard events by estimating the relative exposure of people, buildings, and infrastructure to hazardous conditions. The assessment helped the City set mitigation priorities by allowing them to focus attention on areas most likely to be damaged or most likely to require early emergency response during a hazard event. The vulnerabilities identified in this section consist of an inventory of affected structures completed primarily using GIS to overlay the hazard areas with the locations of individual structures and using population data from the 2010 Census.

- ✓ *Risk Assessment* - in hazard events requires a full range of information and accurate data. Several site-specific characteristics—first-floor elevations for flooding, the number of stories, construction type, foundation type, and the age and condition of the structure for multiple hazards—determine a structure's ability to withstand hazards. In Santa Fe, much of this type of detailed information is not available. Projected loss estimates used in this document are

based on 2010 U.S. Census data. The percentage of potential damage to structures varies depending upon the specific hazard. For example, drought will have no impact on residential structures, while wildfires typically destroy the entire structure.

The Hazard Identification and Risk Assessment (HIRA) is the foundation upon which subsequent mitigation strategies are based. It is a fundamental requirement for the City Hazard Mitigation Plan to comply with the DMA 2000. This section identifies the natural hazards that can occur within the City and provides a systematic analysis of risk and vulnerability to which the county's population and critical infrastructure are subject. In the past, the Stafford Act only provided funding for disaster response and recovery and the Hazard Mitigation Grant Program (HMGP). DMA 2000 stresses the importance of hazard mitigation planning through the HMGP and establishes new requirements for HMGP and the Public Assistance Program.

DMA 2000 is intended to facilitate cooperation between the state and local authorities. It encourages and rewards local HMP planning, and promotes sustainability as a strategy for disaster resistance. This enhanced planning network will better enable the county and those jurisdictions identified in this Plan to project their mitigation needs, resulting in faster allocation of funding and more effective risk reduction projects.

Hazard Analysis

The geographic area in which Santa Fe is located contains a number of natural and manmade hazards of sufficient likelihood of occurrence to warrant discussion. Hazards the MPT identified as significant to include in this HMP plan include:

- Wildland fire
- Flooding
- Severe weather to include extreme cold and heat
- Drought
- Man Made hazards to include terrorism, hazmat incidents, nuclear facility accidents
- Space weather as it impacts communications

This section details the hazard identification and hazard profile steps taken in the risk assessment. It includes an identification of the natural hazards that could occur throughout the county, a description of those hazards, the damage they could cause, a historical review of hazard occurrences, and a discussion of the probability of future occurrences.

Hazard Identification

The first step in preparing a risk assessment for the multi-jurisdiction is to identify which natural hazards affect the county. Numerous documents were consulted to include:

- *New Mexico Natural Hazard Mitigation Plan;* October 2007;
- *Santa Fe County / City of Santa Fe Natural Hazard Mitigation Plan;* December 2006;
- *Santa Fe County Community Widlfire Preparedness Plan , May 2008;*
- *New Mexico Drought Task Force, New Mexico Drought Plan, Update: December 2013*
- *FEMA Maps of the Communities; 2012; and*
- *Other documents and information provided by each jurisdiction identified in the HMP*

These Plans were reviewed and the information provided was used to identify and assess risk to the population and to structures located in areas defined by these plans. (i.e. structures located in the flood plain, in Wildland Urban Interface). The New Mexico Natural Hazard Mitigation Plan provided information to the MPT of other hazards that may occur in the State.

The Santa Fe County Hazard Mitigation Plan was reviewed because of the City of Santa Fe location within the County. Information provided from these documents were used to provide the MPT with other jurisdictions assessment of hazards and why identified and use as an assessment in determining natural hazard risks the county and jurisdictions profiled in this HMP may be vulnerable too.

The MPT began with the hazards identified in the previous HMP and added the hazards identified in the New Mexico Hazard Mitigation Plan, October 2007 and the draft plan currently under development. A copy of the form used to evaluate hazards is located in Appendix B. The following criteria were used by the HMPT to identify hazards (Figures 5, 6 and 7).

Figure 5: Hazard Probability Criteria

No	0	Has not occurred
Nuisance	1	Occurs less than once every 10 years or more
Medium	2	Occurs less than once every 5 to 10 years
High	3	Occurs once every year or up to once every five years

Figure 6: Hazard Risk Criteria

No	0	Has not occurred
Nuisance	1	Loss of critical facilities and services for up to one week
Medium	2	Loss of critical facilities and services from one week to three weeks
High	3	Loss of critical facilities and services for more than three weeks

Figure 7: Hazard Magnitude/Severity

No	0	• Has not Occurred
Nuisance	1	• Negligible property damages (less than 5% of all buildings and infrastructure) • Negligible loss of quality of life • Local emergency response capability is sufficient to manage the hazard
Medium	2	• Moderate property damages (15% to 50% of all buildings and infrastructure) • Some loss of quality of life • Emergency response capability, economic and geographic effects of the hazard are of sufficient magnitude to involve one or more counties
High	3	• Property damages to greater than 50% of all buildings and infrastructure • Significant loss of quality of life • Emergency response capability, economic and geographic effects of the hazard are of sufficient magnitude to require federal assistance

Table 6 presents the final hazard assessment. As noted, hazard identification involved a combination of input from concerned residents and preliminary research from several state and federal resources. Table 7 presents a description of the hazards that were identified as likely to occur, how they were identified, and why they were identified.

Table 6: City of Santa Fe Hazard Assessment

Natural Hazards	Hazard Priority	Probability / Frequency	Magnitude / Severity	Risk
Severe Weather (includes High Wind, Winter Storms and Thunderstorms and Extreme Heat)	1	**High**	**Nuisance**	**Nuisance**
Drought	2	**High**	**Medium**	**Nuisance**
Wildland / Urban Interface Fires	3	**High**	**Medium**	**Medium**
Floods	4	**Medium**	**Nuisance**	**Nuisance**
Human Caused Hazards (including Hazard Material Releases, Nuclear Facility Accidents and Terrorism)	5	**Medium**	**Nuisance**	**Nuisance**
Space Weather	6	**Nuisance**	**Nuisance**	**Nuisance**
Earthquake	7	**No**	**Nuisance**	**No**
Expansive Soil	8	**No**	**No**	**No**
Land Subsidence	9	**No**	**No**	**No**
Landslide	10	**No**	**No**	**No**
Tornado	11	**No**	**Nuisance**	**Nuisance**
Volcanoes	12	**No**	**No**	**No**
Dam Failure	13	**No**	**No**	**No**

Table 7 Summary of Hazard Investigation

Hazard	How Identified	Why Identified
Wildfire	▪ NMDHSEM 2007 All Hazard Plan List ▪ Santa Fe County All Hazard Mitigation Plan 2006 ▪ Planning Team ▪ Outreach to community	▪ Santa Fe County has experienced several large and devastating wildfires in the past few decades ▪ The New Mexico Forestry Division indicated that there are several yearly forest fires.
Floods, including Flash Floods	▪ NMDHSEM 2007 All Hazard Plan List ▪ Santa Fe County All Hazard Mitigation Plan 2006 ▪ Planning Team ▪ Outreach to community)	▪ There have been several previous flood disaster declarations. ▪ A portion of the City is in the floodplain
Severe Weather, extreme cold/heat weather events	▪ NMDHSEM 2007 All Hazard Plan List ▪ Santa Fe County All Hazard Mitigation Plan 2006 ▪ Planning Team ▪ Outreach to community	▪ There have been two recent extreme cold weather events in NM that have affected the citizens of Santa Fe. These events were exacerbated by a natural gas shortage. ▪ NM experienced the hottest June 2013 on record
Drought	▪ NMDHSEM 2007 All Hazard Plan List ▪ Santa Fe County All Hazard Mitigation Plan 2006 ▪ Planning Team ▪ Outreach to community	▪ The City has had droughts in the past. ▪ Residents indicated that droughts have been a recurring problem. ▪ New Mexico, including Santa Fe, is currently undergoing a dry weather phase.
Human-caused Hazards, including Hazardous Materials Releases, Nuclear Facility Accidents, and Terrorism	▪ NMDHSEM 2007 All Hazard Plan List ▪ Santa Fe County All Hazard Mitigation Plan 2006 ▪ Planning Team ▪ Outreach to community	▪ Santa Fe has several facilities that handle or process hazardous materials. ▪ There have been previous transportation accidents and hazardous materials spills. ▪ Localized terrorist events, including school violence, have occurred in Santa Fe. ▪ The federal and state governments have advised every jurisdiction to consider the terrorism hazard.
Space Weather	▪ HMP Planning Team	▪ Bothe NOAA and the US Military recognize space weather as a threat to radio communications

FEMA Disaster Declarations

Disaster declarations, for the county or counties affected by a disaster, are declared by the President of the United States under the authority of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. FEMA then manages the entire process, including making federally-funded assistance available in declared areas; coordinates emergency rescue and response efforts; provides emergency resources; and provides other related activities/funding in the process of aiding citizens and local governments in a nationally-declared disaster. Tables 8, 9 and 10 provide a summary of disaster and emergency declarations for the State of New Mexico (based on review of the FEMA web site and the New Mexico State Hazard Mitigation Plan), with an indication as to whether the City of Santa Fe was part of the declared area.

Table 8 State of New Mexico Major Disaster Declarations: 1954 - 2010

Year	Date	Disaster Type	Disaster Number	City of Santa Fe (Santa Fe County) Declared?
2010	09/13	Severe Storms and Flooding	1936	No
2008	14 Aug	Severe Storms & Flooding	1783	No
2007	S Apr	Severe Storms & Tornadoes	1690	No
2006	30 Aug	Severe Storms & Flooding	1659	No
2004	29 Apr	Severe Storms & Flooding	1514	No
2000	13 May	New Mexico Wildfire	1329	yes
1999	29 Sep	Severe Storms & Flooding	1301	No
1998	29 Jan	Severe Winter Storms	1202	Unknown
1993	7 Jun	Flooding, Severe Storm	992	Unknown
1992	18 Jun	Flooding, Hail, Thunderstorms	945	Unknown
1985	18 Jan	Severe Storms, Flooding	731	Unknown
1984	6 Sep	Severe Storms, Flooding	722	Unknown
1983	24 Oct	Severe Storms, Flooding	692	Unknown
1979	23 Jun	Severe Storms, Snowmelt, Flooding	589	Unknown
1979	29 Jan	Flooding	571	Unknown
1973	11 May	Severe Storms, Snow Melt, Flooding	380	Unknown
1972	20 Nov	Heavy Rains, Flooding	361	Unknown
1972	20 Sep	Heavy Rains, Flooding	353	Unknown
1972	1 Aug	Severe Storms, Flooding	346	Unknown
1965	1 Jul	Severe Storms, Flooding	202	Unknown
1955	15 Aug	Flood	38	Unknown
1954	31 Oct	Flood	27	Unknown

Source: FEMA online at http://www.fema.gov/femaNews/disasterSearch.do

Table 9 State of New Mexico Emergency Declarations: 1954 - 2010

Year	Date	Disaster Type	Disaster Number	City of Santa Fe (Santa Fe County) Declared?
2005	7 Sep	Hurricane Katrina Evacuation	3229	No
Year	**Date**	**Disaster Type**	**Disaster Number**	**City of Santa Fe (Santa Fe County) Declared?**
2000	10 May	New Mexico Fire	3154	No
1998	2 Jul	Extreme Fire Hazard	3128	Yes
1997	2 Mar	Drought	3034	yes

Source: FEMA online at http://www.fema.gov/femaNews/disasterSearch.do

Table 10 State of New Mexico Fire Management Assistance Declarations: 1954 - 2010

Year	Date	Disaster Type	Disaster Number	City of Santa Fe (Santa Fe County) Declared?
2010	06/02/2010	Rio Fire	2843	No
2010	05/24/2010	Cabazon Fire	2842	No
2009	05/07/2009	Buckwood Fire	2818	No
2008	06/25/2008	Big Springs Fire	2777	No
2008	04/21/2008	Trigo Fire	2762	No
2007	11/21/2007	Ojo Peak Fire	2741	No
2007	02/24/2007	Belen Fire	2682	No
2006	06/21/2006	Rivera Mesa Fire	2647	No
2006	06/16/2006	Malpais Fire	2644	No
2006	04/12/2006	Ojo Feliz Fire	2636	No
2006	03/01/2006	Casa Fire	2631	No
2006	01/02/2006	Southeast New Mexico Fire	2600	No
2004	06/18/2004	Bernardo Fire	2522	No
2004	05/25/2004	Peppin Fire	2518	No
2003	06/25/2003	Atrisco Fire (Formerly Bosque Fire)	2472	No
2003	05/10/2003	Walker Fire	2467	No
2002	08/26/2002	Lakes Fire Complex	2459	No
2002	06/13/2002	Roybal Fire Complex	2424	No
2002	06/06/2002	Ponil Fire	2416	No
2002	06/04/2002	Cerro Pelado Fire	2415	No
2002	06/04/2002	Turkey Fire	2414	No

Source: FEMA online at http://www.fema.gov/femaNews/disasterSearch.do

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Hazard Profiles and Vulnerability Assessment

The remainder of this section presents profiles and vulnerability assessment information for the hazards identified above. The order that these hazards are discussed in the remainder of this report reflects the order of priority by the majority of jurisdictions as determined by the Mitigation Planning Team. Table 11 summarizes the comparison of the City of Santa Fe's vulnerability to each identified hazard, according to the data presented in the remainder of Section Two. As discussed in the Introduction Section, the following table is a result of the MPT hazard vulnerability assessment. Based on the assessment, the MPT identified hazards in order of priority. Appendix B provides an example of the assessment used for determining each jurisdictions risk the identified natural hazards.

Table 11 City of Santa Fe Risk Assessment

Hazard	City of Santa Fe, New Mexico			
	Priority	Risk	Extent	Freq
Wildfire	1	High	Medium	Medium
Floods, including flash floods	2	Medium	Nuisance	Nuisance
Severe weather – including winter storms, extreme heat and cold	3	High	Nuisance	Nuisance
Drought	4	High	Medium	Nuisance
Human Caused Hazards – including Hazard Material Releases, Nuclear Facility Accidents and Terrorism	5	Medium	Nuisance	Nuisance
Space Weather	6	Nuisance	Nuisance	Nuisance

Note: Reference figures 5, 6 and 7 for criteria used to evaluate the identified hazards.

As identified in Table 11, only these 6 hazards are profiled in this plan. Other hazards certainly exist, although their occurrence is rare and/or their occurrence has been deemed of relatively little to no impact (nuisance) on the City of Santa Fe. The MPT added Space Weather to the Update due to the increasing reliance on the power grid and communications to modern living.

Future editions of this plan could include revision and re-ranking of hazards, as well as re-evaluation of potential loss estimation based upon evolution of data available for use in the HAZUS–MH application. Future impacts have the capability of changing this plan and may necessitate revision before that identified in Section 4 Plan Maintenance. Information about

hazardous events was obtained by reviewing past state and federal declarations of disasters, conducting internet searches, and interviewing MPT members.

The City is affected by many natural hazards; there are some that do not affect the region due to their location, soil profile and geologic structure. Although earthquakes; and other hazards to include landslides, land subsidence, dam failure and volcanoes were identified in the 2008 mitigation plan data indicated that the City is not susceptible to these hazards. These hazards will not be described in the plan.

Wildland/WUI Fire

Overview – Wildfires in the City of Santa Fe, New Mexico

Wildland fire is defined as any fire burning wildland vegetation-fuels; it includes prescribed fire, wildland fire use, and wildfire. Prescribed fires are planned fires ignited by land managers to accomplish specific natural resource improvement objectives. Fires that occur from natural causes, such as lightning, that are then used to achieve management purposes under carefully controlled conditions with minimal suppression costs are known as wildland fire use (WFU). Wildfires are unwanted and unplanned fires that result from natural ignition, unauthorized human-caused fire, escaped WFU, or escaped prescribed fire. A wildland-urban interface (WUI) fire is a wildfire occurring in areas where structures and other human developments meet or intermingle with wildland vegetation-fuels. WUI fires are a specific concern because they directly pose risks to human lives, property, structures, and critical infrastructure more so than the other types of wildland fires.

Fire behavior is a description of the manner in which a fire reacts to the influences of fuel, weather, and topography. Fire behavior is observed and assessed at the flaming front of the fire and described most simply in terms of fire intensity (heat released) and rate of spread. The implications of observed or expected fire behavior are important components of suppression strategies and tactics, particularly in terms of the difficulty of control and effectiveness of various suppression resources. Fire risk is the probability that wildfire will start from natural or human-caused ignitions. Fire hazard is the presence of ignitable fuel coupled with the influences of topography and weather, and is directly related to fire behavior. Fire severity, on the other hand, refers to the immediate effect a fire has on vegetation and soils.

A WUI involves areas where communities and wildland fuel intermix. Every fire season, catastrophic losses occur as a result of wildfire in WUI areas throughout the western United States. Homes are lost, businesses are destroyed, community infrastructure is damaged, and most tragically, lives are lost. Precautionary action taken before a wildfire strikes often makes the difference between saving and losing a structure. Creating a defensible space around homes, businesses, and other structures is an important component in wildfire hazard reduction. Providing an effective defensible space can be as basic as pruning trees, planting low-flammable vegetation, and cleaning up surface vegetation-fuels and other hazards near a home. These efforts are typically concentrated at a minimum of 30 feet from a building to increase the chance for structure survival and to create an area for firefighters to safely work.

WUI studies suggest that the intense radiant heat of a wildfire is unlikely to ignite a structure that is more than 30 feet away as long as there is no direct flame impingement. Studies of home survivability indicate that homes with noncombustible roofs and a minimum of 30 feet of defensible space have an 85-percent survival rate (Cohen and Saveland 1997). Conversely, homes with wood shake roofs and less than 30 feet of defensible space have a 15 percent survival rate. During a wildfire, structures will burn, wildlife will die or be injured due to burns or smoke inhalation, and death/injury to humans may occur. Wildfires may also create mudslides,

landslides by removing the vegetative covering along slopes, and floods and flashfloods due to heat damaged soils that can resist water penetration.

Wildfire Occurrence

Wildfires are uncontrolled fires often occurring in wildland areas, which can consume houses or agricultural resources if not contained. Wildfires/urban interface is defined as the area where structures and other human development blend with undeveloped wildland.

Forest and grassland fires can occur any day throughout the year. Most of the fires occur during the spring season. The length and severity of burning periods largely depend on the weather conditions. Low humidity, high winds, below-normal precipitation, and high temperatures that are frequently present during the spring result in extremely high fire danger. Drought conditions can also hamper efforts to suppress wildfires as decreased water supplies may not prove adequate to quickly contain the fire. The second most critical period of the year is fall. Depending on the weather conditions, a sizeable number of fires may occur between mid-October and late November.

As more people choose to build homes, operate businesses, and engage in recreational activities in areas where wild-lands border more urban areas, the threat to private property from wildland fire increases. Creating "defensible" or "survivable" space around structures can make the difference between returning to an intact home or a smoldering pile of ashes if a wildfire moves through the area.

Hazard Characteristics

A wildfire is any fire occurring in a wildland area (e.g., grassland, forest, brush land) except for fire under prescription. Wildfires are part of the natural management of forest ecosystems, but may also be caused by human factors. Nationally, over 80 percent of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. The second most common cause for wildfire is lightning.

There are three classes of wildland fires: surface fire, ground fire and crown fire. A surface fire is the most common of these three classes and burns along the floor of a forest, moving slowly and killing or damaging trees. A ground fire (muck fire) is usually started by lightning or human carelessness and burns on or below the forest floor. Crown fires spread rapidly by wind and move quickly by jumping along the tops of trees. Wildland fires are usually signaled by dense smoke that fills the area for miles around.

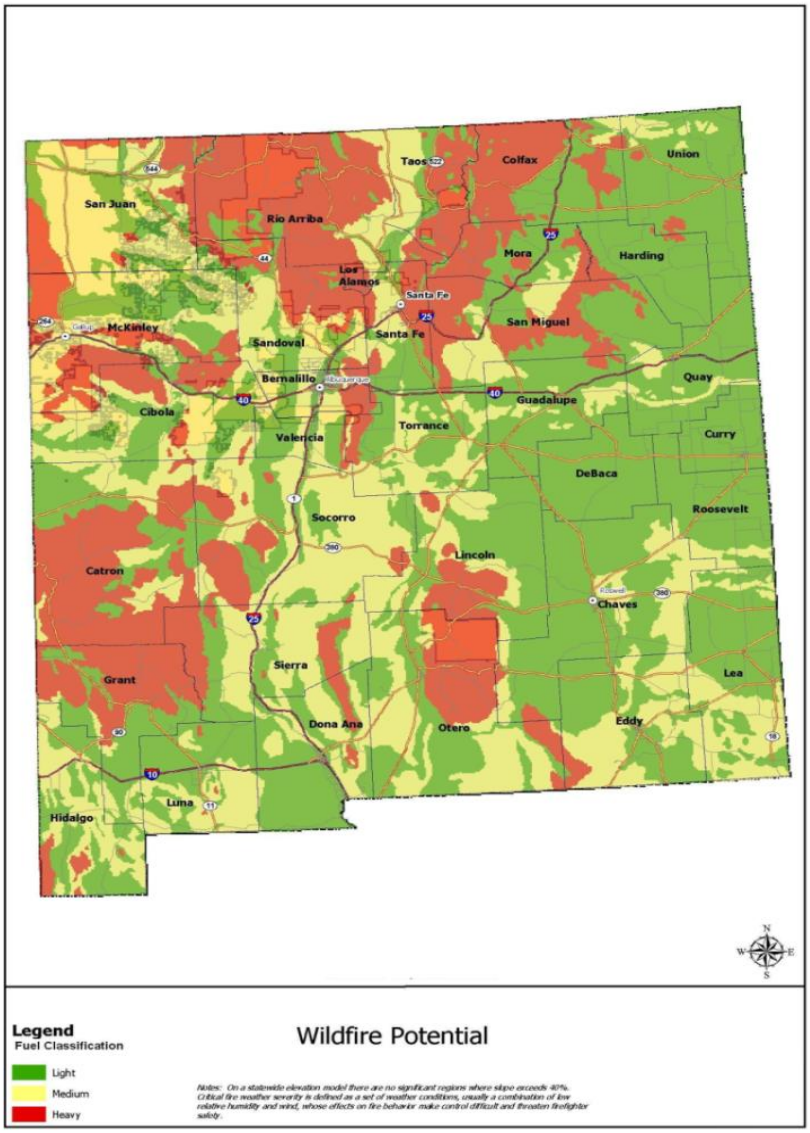
Severity of Occurrence

Topography, fuel, and weather are the three main factors that influence the behavior of a wildfire. Topography can direct the course of a fire. Depressions, such as canyons, funnel air and act as chimneys, intensifying the fire, causing a faster rate of spread. Saddles on ridge tops draw fires and steep slopes can double the rate of spread, due to the close proximity of fuel

(vegetation). The rate of spread is generally stated in chains per hour, feet per minute, or meters per minute.

Fuel type, continuity of fuel, and the moisture content of the fuel all effect wildfire behavior. Continuity of fuel applies both horizontally across the landscape and vertically, from the ground surface up to tree crowns via the understory. Weather can have a profound influence on wildfires. Wind can direct the course of a fire and increase the rate of spread. High temperatures and low humidity can intensify fire, while low temperatures and high humidity can greatly limit the potential of a fire. Figure 8 identifies those potential wildfire hazard areas in the state of New Mexico according to fuel type. Several areas around the City of Santa Fe have been identified with medium to high fuel classification.

Figure 8: Potential Wildfire Hazard Areas



Source: New Mexico Resource Geographic Information System Program, ttp://rgis.unm.edu/intro.cfm; 2012

Many factors that determine the potential for fire include relative humidity, moisture content of the fuel, atmospheric stability, drought, available energy of the fuel, probability of ignition, rate of spread, and the slope and fuel levels of the area. These factors are taken into account when determining the fire danger for a specific area.

Relative humidity – Relative humidity is the ratio of the amount of moisture in the air to the amount of moisture necessary to saturate the air at the same temperature and pressure. Relative humidity (RH) is expressed in percent. RH is measured directly by automated weather stations or by taking wet and dry bulb readings with a psychrometer and then applying the National Weather Service psychrometric tables applicable to the elevations where the reading were taken.

Fuel moisture – Fuel moistures in live herbaceous (annual and perennial), woody (shrubs, branches, and foliage) fuels, and dry (dead) fuels are calculated and represent approximate moisture content of the fuel. Fuel moisture levels are measured in 1-, 10-, 100-, and 100-hour increments.

The Lower Atmosphere Stability Index or Haines Index – This index is computed from the morning soundings from Radiosonde Observation (RAOB) stations across North America. The index is composed of a stability term and a moisture term. The stability term is derived from the temperature difference at two atmospheric levels. The moisture term is derived from the dew point depression at a single atmosphere level. This index has been shown to correlate with large fire growth on initiating and existing fires where surface winds do not dominate fire behavior. Haines Indexes range from 2 to 6 for indicating the potential for large fire growth:

2 = Very Low Potential (moist, stable lower atmosphere)
3 = Very Low Potential
4 = Low Potential
5 = Moderate Potential
6 = High Potential (dry, unstable lower atmosphere)

Keetch-Byram Drought Index (KBDI) – used to measure the affects of seasonal drought on fire potential. The actual numeric value of the index is an estimate of the amount of precipitation (in 100ths of inches) needed to bring soil back to saturation (a value of 0 being saturated). The index deals with the top 8 inches of soil profile so the maximum KBDI value is 800 (8 inches), the amount of precipitation needed to bring the soil back to saturation. The index's relationship to fire is that as the index values increase, the vegetation is subjected to greater stress because of moisture deficiency. At higher values, living plants die and become fuel, and the duff/litter layer becomes more susceptible to fire.

KBDI = 0–200: Soil moisture and large class fuel moistures are high and do not contribute much to fire intensity. This is typical of spring dormant season following winter precipitation.

KBDI = 200–400: Typical of late spring, early growing season. Lower litter and duff layers are drying and beginning to contribute to fire intensity.

KBDI = 400–600: Typical of late summer, early fall. Lower litter and duff layers actively contribute to fire intensity and will burn actively.

KBDI = 600–800: Often associated with more severe drought with increased wildfire occurrence. Intense, deep burning fires with significant downwind spotting can be expected. Live fuels can also be expected to burn actively at these levels.

The Energy Release Component (ERC) – the estimated potential available energy released per unit area in the flaming front of a fire. The day-to-day variations of the ERC are caused by changes in the moisture contents of the various fuel classes, including the 1,000-hour time lag class. The ERC is derived from predictions of the rate of heat release per unit area during flaming combustion and the duration of flaming.

The Ignition Component – a number that relates the probability that a fire will result if a firebrand is introduced into a fine fuel complex. The ignition component can range from zero, when conditions are cool and damp, to 100 on days when the weather is dry and windy. Theoretically, on a day when the ignition component registers a 60 approximately 60% of all firebrands that encounter wildland fuels will require suppression action.

The Spread Component – a numerical value derived from a mathematical model that integrates the effects of wind and slope with fuel bed and fuel particle properties to compute the forward rate of spread at the head of the fire. Output is in units of feet per minute. A Spread Component of 31 indicates a worst-case, forward rate of spread of approximately 31 feet per minute. The inputs required in to calculate the SC are wind speed, slope, fine fuel moisture (including the effects of green herbaceous plants), and the moisture content of the foliage and twigs of living, woody plants. Since the characteristics through which the fire is burning are so basic in determining the forward rate of spread of the fire front, a unique SC table is required for each fuel type. *(Indicators Source: http://www.nps.gov/nifc/public/pub_und_understandingfire.cfm)*

Previous Occurrences – City of Santa Fe, New Mexico

The Pacheco Fire began on June 18, 2011 came within two miles of the Santa Fe Ski Basin burned over 10,000 acres. The Pacheco Fire threatened the Santa Fe Watershed and the Santa Fe Ski Area.

While the Pacheco Fire was still uncontained, the Las Conchas Fire started on June 26 in the Santa Fe National Forest and burned more than 150,000 acres, threatening Los Alamos National Laboratory and the town of Los Alamos. After five days of burning, it became the largest wildfire in New Mexico state history at the time. Although these fires did not burn within the City of Santa Fe, residents were affected by smoke and the economic impact to tourism and the closing of LANL, a large employer of in the Santa Fe area.

In May 2000, one of the most damaging wildfires in the State of New Mexico occurred when a prescribed burn went out of control in Santa Fe County. The fire, which is now known as the Cerro Grande Fire of 2000, spread quickly to neighboring Los Alamos County. More than 48,000 acres were burned, with 350 families losing their homes. The fire was declared a presidential disaster and a subsequent act of Congress created the Cerro Grande Fire Assistance Program that has paid out more than $243 million in fire related claims as of November 13, 2001 (FEMA, 2001). The damage to the community continued after the fire ended as increased stormwater runoff from rainfall events rushed down fire-scoured mountains and hillsides, producing mudslides, erosion, and silting that wiped out roads and utilities.

Frequency

According to the US Forestry Service, Wildfires can occur at any time of day and during any month of the year, but the peak fire season in New Mexico is normally from March through June. The length of the fire season and the peak months vary appreciably from year to year. Land use, vegetation, amount of combustible materials present, and weather conditions such as wind, low humidity, and lack of precipitation are the chief factors in determining the number of fires and acreage burned. Generally, fires are more likely when vegetation is dry from a winter with little snow and/or a spring and summer with sparse rainfall. Any small fire in a wooded area, if not quickly detected and suppressed, can spread out of control. Human carelessness, negligence, and ignorance cause most wildfires. However, some are precipitated by lightning strikes and in rare instances, spontaneous combustion.

Potential aftermath of wildfires in addition to damage to structures includes severe erosion, and the silting of streambeds and reservoirs, resulting in damage to the watershed, and flooding due to a loss of ground cover.

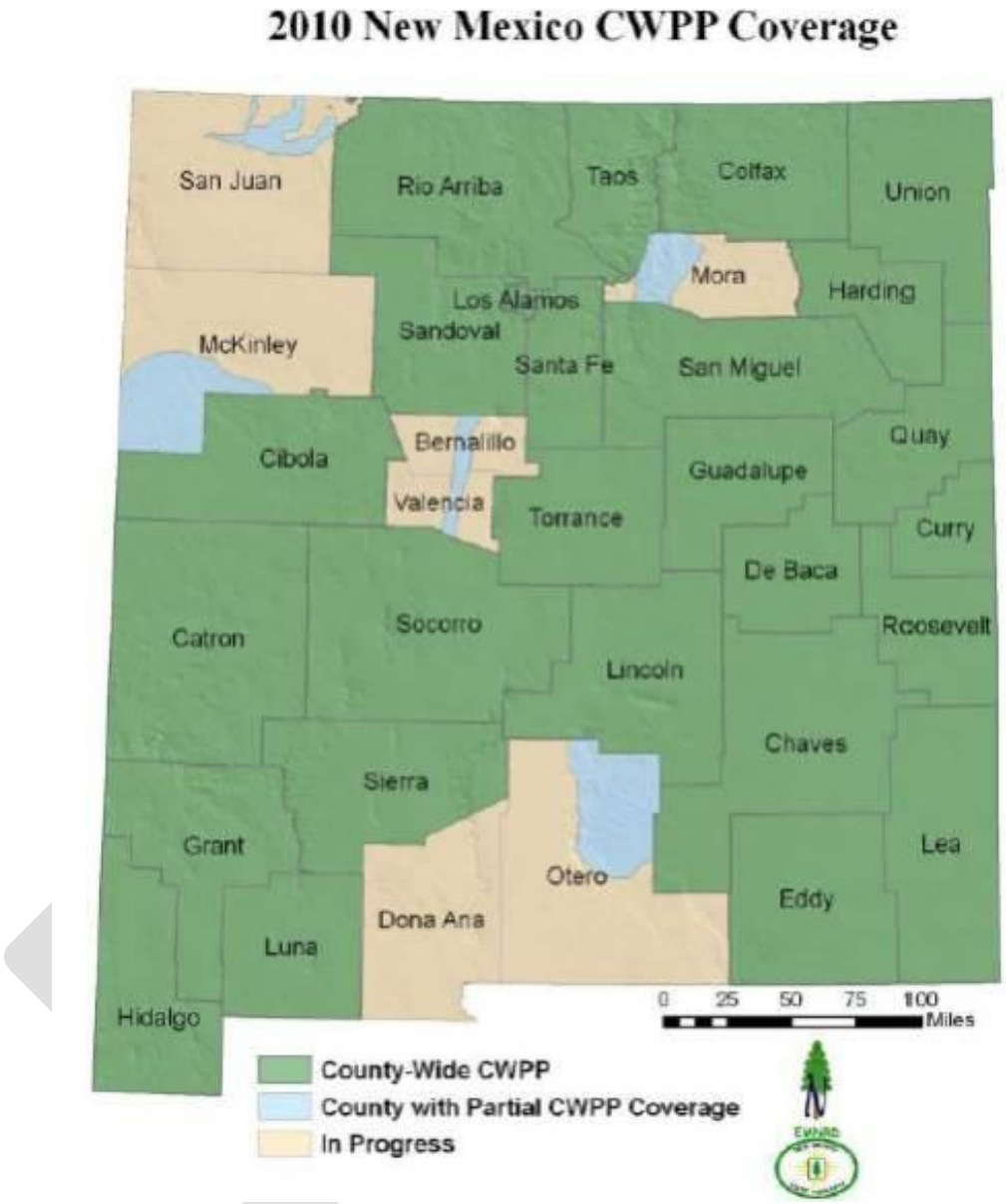
In 2011, the New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division, updated the State Fire Plan, which identifies the communities (geographically distinct areas including small towns and subdivisions) and tribal areas that are most vulnerable to wildland-urban interface fires.[12] The criteria used to rank the areas included:

- Proximity of vegetation type to homes
- Availability of water
- Ease of evacuation
- Topography – ridge, valley, slope, and exposure
- Type of fuels (forest type)
- Number and size of previous fires
- Direction of prevailing and local winds in each community
- Ability of community/subdivision to protect homes

Figure 9 shows Community Wildfire Protection Plan (CWPP) coverage in New Mexico as of December 1, 2012 which identifies Santa Fe County (City of Santa Fe) with a current plan.

[12] New Mexico Communities at Risk Assessment Plan, New Mexico Energy, Minerals and Natural Resources Department Forestry Division; New Mexico Fire Plan http://www.emnrd.state.nm.us/FD/FireMgt/Fire.htm

Figure 9: New Mexico CWPP Coverage as of December 1, 2012



Source: New Mexico Fire Plan http://www.emnrd.state.nm.us/FD/FireMgt/Fire.htm

Santa Fe County and by extension the City of Santa Fe is extremely susceptible to wildfire due to the arid climate, ongoing drought, and unhealthy forests. In addition, much of the heavily forested areas in Santa Fe County are located on steep slopes, including much of the water shed areas, which aid in the spread of fires and add to the difficulty of fighting a wildfire. These factors although more prevalent in the County contribute to the severity of wildfires that may spread to the City. Several factors contribute to the degradation of forests in the Southwest:

As a result, wildland-urban interface areas of Santa Fe County contain tree densities that are several times greater than what is considered to be a healthy forest, with thick stands of stunted

trees and large accumulations of fuels. The higher-than-normal tree densities and accumulation of fuels present a significant continued threat of wildfire to structures located in the wildland-urban interface area.

The 2008 Santa Fe County Community Wildfire Protection Plan's Core Team and input from the public meetings has identified the Santa Fe Watershed as an area in need of protection from wildfires. The Santa Fe Watershed is an important a source of municipal water. The Santa Fe River, which is located in the Santa Fe Watershed provides water supply to two reservoirs the McClure, Nichols, and Two Mile reservoirs. The estimated total area of the watershed area is 17,520 acres of this the City of Santa Fe owns 1,124 acres. The Santa Fe Watershed provides 40% of the water supply to the City of Santa Fe (Santa Fe County CWPP, 2008).

Severity and Probability of Occurrence

Forestland in Santa Fe County is extremely susceptible to wildfire due to the arid climate, recent drought, and degraded timber stands. In addition, much of the heavily forested areas in Santa Fe County are located on steep slopes, which aid in the spread of fires and add to the difficulty of fighting a wildfire. Several factors contribute to the degradation of forests in the Southwest:

- ✓ Increased tree density and decreased grass and forb (broad-leaved herbs that grow in fields, prairies, or meadows) cover.
- ✓ Past forest fire suppression practices and livestock overgrazing that resulted in the unnaturally heavy accumulation of live and dead vegetation and led to "doghair" thickets of ponderosa pine trees.
- ✓ Early logging activity in different regions that creates artificial fuel breaks, alters the local microclimate, and modifies forest composition and age structure (Gilmore, 1998).

As a result, wildland-urban interface areas of Santa Fe County contain tree densities that are several times greater than what is considered to be a healthy forest, with thick stands of stunted trees and large accumulations of fuels. The higher-than-normal tree densities and accumulation of fuels present a significant continued threat of wildfire to structures located in the wildland-urban interface area. Table 12 shows those fires over 100 acres in size on record within Santa Fe County. Though not in the city, these fires could have potential for causing problems during the event and with issues following the event (debris in watershed affecting downstream recipients) as discussed in the vulnerability section of this assessment.

Table 12: Fires Over 100 Acres in Size on Record within Santa Fe County (1970 to 2013)

Name	Start Date	Acres Burned
Unknown	May 10,1988	122
Frijoles	June 15,1993	2,626
Quemado	June 15,1993	4,300
Lamy	May 3,1996	220
Familia	May 31,1996	300

Name	Start Date	Acres Burned
Ramada	March 4,1998	600
Windmill	March 10,1998	100
Curvey	March 12,1998	125
Turquoise	June 15,2000	100
Borrego	May 22,2002	12,995
Molina	June 3,2003	900
Capulin	June 23,2003	7,429
Mosely	June 15,2006	1,250
Pacheo	June 18, 2012	10,000

Source: Santa Fe Country CWPP, 2008

Vulnerability Assessment – Wildfires

Existing Community Assets

The Santa Fe River located in the Santa Fe Watershed provides water supply to the McClure, Nichols, and Two Mile reservoirs. The estimated total area of the watershed area is 17,520 acres. The Santa Fe National Forest is responsible for 15,493 acres, of which half of is located in the Pecos Wilderness; The City of Santa Fe owns 1,124 acres; The Randall Davey Audubon Society owns 135 acres; The Nature Conservancy owns 290 acres; And the remaining 478 acres are privately owned (Steelman and Kunkel 2003).

A wildfire on the upper slopes of the watershed or one that enters the watershed from adjacent drainages during a severe fire season could easily transition to a sustained crown fire. Resistance to control from this extreme fire behavior would be high, particularly where numerous spot fires could ignite more than a mile from the main fire and threaten numerous values.

Loss of structures in adjacent communities, threats to life and recreational and scenic values, severe soil erosion, and sedimentation are all possible. Damage to the city of Santa Fe's drinking water supply, of which 40% is provided by the Santa Fe Watershed (Steelman and Kunkel 2003),and potential flooding into parts of Santa Fe are realistic, undesirable outcomes from such a high intensity wildfire. Resulting ecological damage, reminiscent of the 2000 Cerro Grande fire, would require decades to recover. Risk/hazard rating for the Santa Fe Watershed is **Very High** (Santa Fe County CWPP, 2008)

The impact of wildfire on the City of Santa Fe should not be measured by the number of acres or structures burned or the actual cost of suppression only. A recent study, *The Full Cost of New Mexico Wildfires*, January 2013 sites less obvious costs:

- Alteration of wildlife habitat
- Damage to watershed and water supply
- Damage to public recreation facilities
- Evacuation of adjacent communities
- Tourism impact
- Damage to timber resources
- Destruction of cultural and archaeological sites
- Costs of rehabilitation and restoration
- Public health impacts
- Transpiration impacts.

These costs do not end when the wildfire is contained but can continue for years after an event. Additionally these impacts will affect neighboring communities with no regard to political boundaries.

Critical Facilities

The Santa Fe watershed that supplies approximately 40% of the City of Santa Fe's water is located in one of the most vulnerable areas of the State. A wildfire in the watershed would threaten the water supply for the City.

Future Development Trends

In recent years, New Mexico, and Santa Fe County in particular have experienced an increase in population, especially in areas located in or near forest/range lands. Increasing residential development into wildland-urban interface areas will likely increase the occurrence of human-caused fires and the number of people and property at risk due to wildfire. As picturesque forested lands are transformed into residential areas, the wildland-urban interface area increases, creating more risk for both the forest and the population residing there.

There are currently 2,717 undeveloped acres in Santa Fe County identified as high wildfire vulnerability. Santa Fe is the largest city in the County and may annex portions of these undeveloped acres. Assuming 1-acre lot sizes, this translates into between 2,000-3,000 developable lots in the County. In the absence of data regarding the amount of developable, vacant land, the aforementioned numbers are a rough estimate of the maximum potential for future development, although it is unlikely that the entire area is developable.

Recent enactment of a wildland-urban interface fire code in the County and the City of Santa Fe will help to mitigate the impact of wildfires on vulnerable residential areas and make new subdivisions more fire resistant. Traditional tactics for preventing wildfires have focused on fire suppression. Rather than trying to stop all wildfires, mitigation measures included in the new code focus on reducing fuel loads and creating defensible spaces to reduce structural damage caused by wildfires. More specific mitigation goals and actions are detailed in Section 3 of this document.

Conclusions – Wildfires

Summary of Hazard Identification and Vulnerability Assessment

Past experience has proven that wildfires can be a significant threat to the citizens, structures, infrastructure, and natural resources within Santa Fe. Although most of the vulnerability to wildfires occurs outside the City the effect of any nearby wildfire does affect the health and economic welfare of City residents. Most importantly, the City of Santa Fe water supply is within the high-risk wildfire areas. As a result, the Mitigation Planning Team has identified the wildfire hazard as the first priority in the Plan.

What Can Be Mitigated?

Mitigation options for wildland fire need to address not only the management of fuels, but also the potential for growing population in wildfire threat areas.

Traditional tactics for preventing wildfires have focused on fire suppression. Rather than trying to stop all wildfires, mitigation measures such as reducing fuel loads and creating defensible spaces aim to reduce the damage caused by wildfires. More specific mitigation goals and actions are detailed in Section 3 of this document.

Climate Change: The National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA), agree that climate change is occurring and that humans are contributing to it. Numerous scientific organizations have similar statements, both in the United States and abroad.

Scientists are still researching a number of important questions, including exactly how much the Earth will warm, how quickly it will warm, and what the consequences of the warming will be in specific regions of the world. Scientists continue to research these questions so we can be better informed about how to plan for a changing climate. However, enough certainty exists about basic causes and effects of climate change to justify taking actions that reduce future risks (EPA.gov, 2013)

The Santa Fe County CWPP addresses climate change in its 2008 plan. Recent climate patterns have degraded natural fire regimes, climate change has also played an extensive role in altering fire occurrence and severity, influencing the vegetative cover and available burnable fuel across the western landscape. In the past few years, fires have grown to record sizes, are burning earlier and longer, and are burning hotter and more intensely than they have in the past [Westerling et al. 2006]. According to the National Interagency Fire Center (NIFC), occurrence of catastrophic wildfires has greatly increased over the last 20 years. Westerling et al. (2006) claim that a study of large wildfires (approximately 988 acres) throughout the western United States from 1970 to 2003 saw a pronounced increase in frequency of fire since the mid 1980s. Fires from 1987 to 2003 have been four times more frequent than the 1970 to 1986 average. After 1987, the length of the fire season has also been observed to increase by 78 days. Within just the last seven years, a record number of acreages have burned, and numbers are continually getting larger [NIFC 2006].

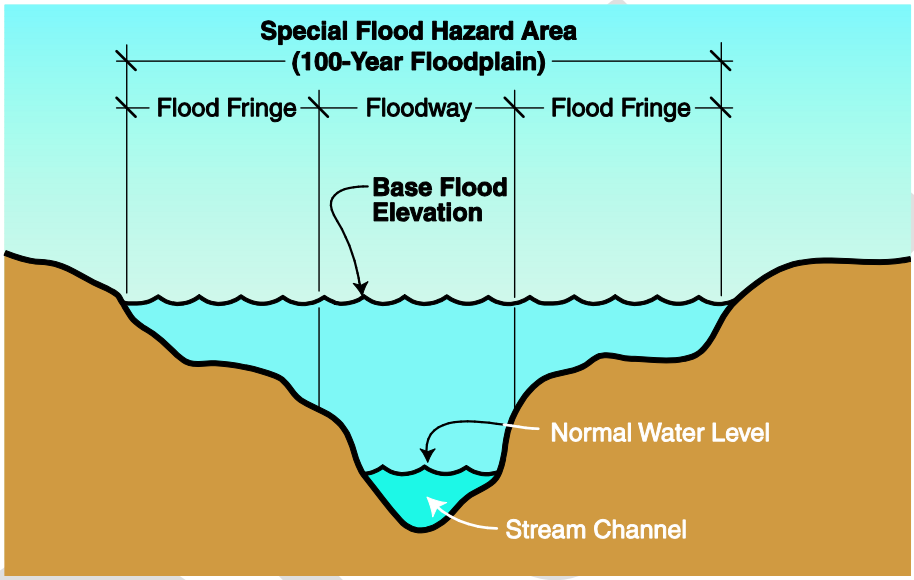
According to the Santa Fe CWPP changes in relative humidity have been blamed for much of these changes as increased drying over much of the Southwest has led to an increase in days with high fire danger. Western grasslands are predicted to undergo increased expansion of woodier vegetation, such as piñon juniper, associated with increased precipitation occurring during typical wet seasons. Summer months are predicted to be hotter and longer, which will also contribute to increased fire risk. Under greater climatic extremes widely predicted throughout the U.S., fire behavior is expected to become more erratic, with longer flame lengths, increased torching and crowning, and more rapid runs and blowups associated with extremely dry conditions.

In a Government Accountability Office (2007) report on climate change and federal lands, natural resource experts from numerous federal and state agencies as well as leading academic experts predict that climate change will cause forest fires to grow in size and severity. This in turn will impact the safety of communities located not just in WUIs but in even larger areas as a result of impaired air quality resulting from vast smoke production. Experts working under the auspices of the DOE's Accelerated Climate Prediction Initiative similarly warn of the increased risks. The costs of fire suppression as well as the expense of fire preparedness are likely to increase in parallel with increasingly larger fires (Santa Fe CWPP, 2013).

Floods / Flash Floods

Nationwide, hundreds of floods occur each year; making flooding one of the most common hazards in all 50 states and U.S. territories. Most injuries and deaths from flooding happen when people are swept away by flood currents and most property damage results from inundation by sediment-filled water. The majority of flood events in the U.S. involve inundation of floodplains (see Figure 10) associated with rivers and streams and shoreline inundation along lakes and coastlines.

Figure 10: Definition Sketch for Floodplains



Source: *Understanding Your Risks* – FEMA Publication 386-2, page 2-12.

This type of flooding typically results from large-scale weather systems generating prolonged rainfall or from locally intense storms or from snowmelt. For the purposes of this report, this type of flooding is referred to as "riverine flooding" and is characterized by a gradual and predictable rise in a river or stream due to persistent precipitation. After the stream or river overflows its banks, the land nearby remains under water for an extended period of time. Although the State of New Mexico and Santa Fe may experience riverine flooding, flash flooding is a more common and more damaging type of flooding. Flash floods are aptly named: they occur suddenly after a brief but intense downpour; they move quickly and end abruptly. Although the duration of these events is usually brief, the damages can be quite severe. People are often surprised at how quickly a normally dry arroyo can become a raging torrent. Flash floods are the primary weather-related killer with around 140 deaths recorded in the U.S. each year. Flash floods are common and frequent in New Mexico, and, as a result, New Mexico has the tenth highest flash flood fatality rate in the nation.

Flash flooding also produces erosion and mud and debris flows that damage homes and infrastructure. Flash floods result as a secondary effect from other types of disasters, including large wildfires and dam breaks. Wildfires remove vegetative cover and alter soil characteristics,

increasing the quantity and velocity of stormwater runoff. Banks and soils previously stabilized by vegetation are quickly eroded by rainwater on unprotected soils.

HAZARD PROFILE—FLASH FLOODS

Hazard Characteristics

Flash floods occur in developed areas from intense rainfall flowing into overburdened dry riverbeds, arroyos and man-made stormwater structures. Flash flooding in undeveloped areas is likely to occur when heavy rains fall on impervious desert soils or previously saturated soils. Summer thunderstorms that deposited large quantities of rainfall over a short period of time have also produced flash flooding. Flash floods peak during the Southwest monsoon season of July and August.

Flash floods are more likely to occur in places with steep slopes and narrow stream valleys, and along small tributary streams. In urban areas, parking lots and other impervious surfaces that shed water rapidly contribute to flash floods. In rugged, hilly, and steep terrain, the high-velocity flows and short warning time make flash floods hazardous and very destructive.

Santa Fe County (City of Santa Fe) has several conditions that may contribute to flash floods and exacerbate their effects:

- ✓ Steep Slopes: Santa Fe County has a moderate to steeply sloping terrain that can contribute to flash flooding since runoff reaches the receiving arroyos and rivers more rapidly over steeper terrain. Flood studies conducted by FEMA indicate that flood velocities along the Santa Fe River can reach 22 feet/second. Flows of 5 feet/second are considered high velocity.
- ✓ Obstructions: During floods, obstructions can block flood flow and trap debris, damming floodwaters and potentially causing increased flooding uphill from the obstructions.
- ✓ Soils: Soils throughout much of Santa Fe County are derived from unconsolidated sands, silts and clay of the underlying Tesuque Formation. As a result, soils are typically fine-grained, and have low infiltration rates and high runoff potential. Sparse vegetative cover combines with high runoff soil potential to result in significant flooding hazards in ephemeral washes (not continuously containing water) and adjacent areas. Accelerated soil erosion has created problems ranging from loss of productive agricultural soil to displacement of human structures to sediment buildup in water reservoirs. Water erosion is one of the most common geologic phenomena. The detachment and transportation of soil particles by water can cause sheet erosion, rill erosion or gully erosion. Sheet erosion occurs with soil being removed in a uniform manner across the surface but is often accompanied by tiny channels cut into the surface creating rill erosion. Where the volume of runoff water is further concentrated the formation of larger channels or gullies may occur within the landscape creating gully erosion. Rill and gully erosion can cause serious land use problems. Storm events in New Mexico can result in flashfloods and can create serious rill and gully erosion. Erosion damage from flash flooding includes access disruption, road closures, driving hazards, drainage facility

damage and blockage, sedimentation, etc. Erosion can occur rapidly during a storm event or can occur over time due to minor storms or breaks in water lines.

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence. Flood studies use historical records to determine the probability of occurrence for different extents of flooding. The probability of occurrence is expressed as the percentage chance that a flood of a specific extent will occur in any given year.

Table 13 shows a range of flood recurrence intervals and their probabilities of occurrence. Every year, a 10-year flood has a greater likelihood of occurring (10% chance) than a 100-year flood (one-percent chance).

Table 13: Flood Probability Terms

Flood Probability Terms	
Flood Recurrence Intervals	**Chance of occurrence in any given year**
10 year	10%
50 year	2%
100 year	1%
500 year	0.2%

Source: Floods – Recurrence intervals and 100-year floods; USGS http://ga.water.usgs.gov/edu/100yearflood.html

The extent of flooding associated with a one percent annual probability of occurrence—the base flood—is used as the regulatory boundary by a number of federal, state, and local agencies. Also referred to as the Special Flood Hazard Area, this boundary is a convenient tool for assessing vulnerability and risk in flood-prone communities since many communities have maps that show the extent of the base flood and the likely depths that will be experienced. The base flood is often referred to as the 100-year flood. Since its one-percent probability of occurring in any one year implies a recurrence interval of 100 years, this is often mistaken to have a literal meaning of "once every 100 years." Experiencing a 100-year flood does not mean a similar flood cannot happen for the next 99 years; rather, it reflects the probability that over a long period of time, a flood of that magnitude should occur in only one-percent of all years. Smaller floods occur more often than larger (deeper and more widespread) floods.

The determination of the extent of the base flood for Santa Fe County is assumed to account for flash flooding events as well. Therefore, the base flood extent is used for this study as an approximation of the area that may be affected by a significant flash flood of that recurrence interval. The location of the flood hazard areas in the City is shown on the accompanying floodplain maps in Appendix C.

National Flood Insurance Program

In 1968, Congress created the National Flood Insurance Program (NFIP) in response to the rising cost of taxpayer funded disaster relief for flood victims and the increasing amount of damage caused by floods. The Federal Insurance and Mitigation Administration (FIMA) manage the National Flood Insurance Program (NFIP) and implement a variety of programs authorized by Congress to reduce losses that may result from natural disasters. FIMA is a component of the FEMA manages the NFIP, and oversees the floodplain management and mapping components of the Program.

Nearly 20,000 communities across the United States and its territories participate in the NFIP by adopting and enforcing floodplain management ordinances to reduce future flood damage. In exchange, the NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in these communities.

The NFIP Community Rating System (CRS) was implemented in 1990 as a program to recognize and encourage community floodplain management activities that exceed minimum NFIP standards. The National Flood Insurance Reform Act of 1994 codified the CRS in the NFIP. Under the CRS, flood insurance premium rates are adjusted to reflect the reduced flood risk resulting from community activities that meet the three goals of the CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote the awareness of flood insurance.

Flood damage is reduced by nearly $1billon a year through partnerships with NFIP and CRS communities, the insurance industry, and the lending industry. Buildings constructed in compliance with NFIP building standards also suffer approximately 80% less damage annually than those not built in compliance. Further, every $3 paid in flood insurance claims saves $1 in disaster assistance payments.

The NFIP is self-supporting for the average historical loss year, which means that operating expenses and flood insurance claims are not paid for by the taxpayer, but through premiums collected for flood insurance policies. The program has borrowing authority from the U.S. Treasury for times when losses were heavy; however, these loans are usually paid back with interest. To obtain secured financing to buy, build, or improve structures in Special Flood Hazard Areas (SFHAs), flood insurance must be purchased. Lending institutions that are federally regulated or federally insured must determine if the structure is located in a SFHA and must provide written notice requiring flood insurance. Flood insurance is available to any property owner located in a community participating in the NFIP. All areas are susceptible to flooding, although to varying degrees. In fact, 25% of all flood claims occur in low-to-moderate risk areas.

The most widely adopted design and regulatory standard for floods in the United States is the 1% annual chance flood and this is the standard formally adopted by FEMA. The 1% annual flood, also known as the base flood elevation, has a 1% chance of occurring in any particular

year. It is also often referred to as the "100-year flood" since its probability of occurrence suggests it should only reoccur once every 100 years (although this is not the case in practice). Experiencing a 100-year flood does not mean a similar flood cannot happen for the next 99 years; rather it reflects the probability that over a long period of time, a flood of that magnitude should only occur in 1% of all years.

Two hundred forty one (241) NFIP policies were in force in the City of Santa Fe in June 2013, for a total flood insurance coverage of more than $72 million (Table 14). Over $69,144 has been paid out in the City for flood damage since the establishment of the NFIP in 1978. At present, there are no identified repetitive-loss properties in the City.

Table 14: National Flood Insurance Statistics for Santa Fe

NFIP Flood Insurance Statistics for Santa Fe	
Policies In-force	**241**
Premiums Paid	**$222,918**
Insurance In-force	**72,030,900**
Total Losses	**5**
Total Payments	**$69,144**
Repetitive Loss	**0**

Source: City of Santa Fe CFM, June 2013

PREVIOUS OCCURRENCES – FLOODING

New Mexico has a long history of flash flooding problems. Many minor flash flood events occur each year during New Mexico's summer monsoon season. Due to the small scale and localized nature of these events, no consistent records are available. Table 15 lists some of the significant flash flood events in Santa Fe since 1996.

Table 15: Significant Flash Flood Events in Santa Fe, New Mexico

Date	Estimated Damages
8/25/1996	$90,000
6/7/1997	$200,000
7/30/1997	None reported
7/31//1997	None reported
8/15/2004	$50,000
6/21/2005	None reported
7/18/2005	None reported
7/19/2007	$70,000

Date	Estimated Damages
7/21/2007	$5,000
7/14/2008	$25,000
7/15/2008	$10,000
8/047/31/2010/2008	$5,000
8/19/2011	None reported
8/21/2011	$50,000
Total	**$505,000**

Source: www.ncdc.noaa.cgi-win, June 2013

Vulnerability Assessments Flooding

Existing Community Assets

Flood vulnerability is described in terms of the community assets that lie in the path of floods. There are 1,255 structures within the City of Santa Fe in an identified Flood Zone (Table 16). The flood hazard vulnerability assessment for Santa Fe County focused on the base flood elevation, though floods of both greater and lesser flood depths are possible. Vulnerability to flash floods is difficult to determine because local terrain, soil conditions, and construction play a role in how much storm water is able to run off, percolate into the soil, or cause flash flooding. The 2008 Santa Fe Hazard Mitigation Plan identified 1,321 structures in the 100 year Floodplain; however maps for City of Santa Fe were recently updated and reported 66 fewer structures within the newly mapped floodplain.

Table 16: Structures identified in the 100 Year Floodplain in Santa Fe, New Mexico

Residential Zoning Parcels	Commercial Zoning Parcels	Mixed commercial/residential Zoning Parcels	Total
978	136	141	1,255
*Estimated using 2010 U.S. Census data			

Critical Facilities

Three historical places are listed within the 100-year floodplain. All three are privately owned hotels. No other critical facilities are located in the Santa Fe floodplain.

Future Development Trends

Santa Fe County's Comprehensive Growth Plan and Land Use Ordinances prohibit construction in the floodways, arroyos and other natural drainage ways. However, lots that were platted prior

to the adoption of the Comprehensive Plan may be developed with the requirement that the building be either elevated above the floodplain level or dry-flood proofed.

CONCLUSIONS – FLASH FLOODS

Flash floods have been and will continue to be a significant threat to the economic and social well being of selected areas of the County. The City of Santa Fe, has a significant population and economic assets that are vulnerable to flood damages. Exacerbating the effects of flooding in the City are steep slopes, unstable desert soils, and obstructions in the floodplain.

Due to the vulnerability of the City to flood/flash flood events, the Hazard Mitigation Team has identified flash flood hazard mitigation as one of its priorities.

What Can Be Mitigated?

Determining the aspects of Santa Fe flood vulnerability that can be mitigated requires a review of the causal factors for floods and the assets that can be affected. In Santa Fe most flash flood events result in direct damage to structures, infrastructure and erosion in developed areas. As a result, available alternatives for mitigation actions should focus on property protection, corrective measures for drainage and erosion in developed areas and future development in the municipalities.

Climate Change

According to NOAA, the decade from 2000 to 2010 was the warmest on record, and 2010 was tied with 2005 as the warmest year on record. Warmer temperatures are accompanied by other changes in weather and climate. Many places have experienced changes in rainfall resulting in more intense rain, as well as more frequent and severe heat waves.

Even with this global warming, at the local or regional level, we can expect to have some colder-than-average seasons or even colder-than-average years. For example, in the Eastern United States, the winters of 2010 and 2011 were colder than the average winters from the previous decades. In fact, extra snowy winters can be expected. In a warmer climate, more water vapor is held in the atmosphere causing more intense rain and snow storms. As the climate warms, we do expect the duration of the snow season to decrease; however, as long as it is still cold enough to snow, a warming climate can lead to bigger snowstorms (EPA.gov, 2013).

Data Limitations

The flood vulnerability analysis has the following limitations:

Flash Floods Predictability: The location and occurrence of flash floods are difficult to predict and dependent on local conditions of terrain, land use, and percent of impervious cover.

Data for Structures – Attributes: The Santa Fe County Tax Assessor's office has not developed a detailed property database with the information necessary to determine the losses possible to flood-vulnerable structures. Replacement value (the cost to rebuild) is a necessary component in estimating the dollar amount of losses in a flood and, when coupled with a range of flood probabilities from the 10-year to 500-year flood depths, can help in describing the benefits and

costs of mitigation actions in monetary terms. Information such as the first floor elevations, number of stories, the foundation type, and construction type of structures was not readily available in Santa Fe at the time this Plan was developed.

Data for Structures – Coverage: The figures for City of Santa Fe homes and businesses vulnerable to flood in Table 16 are based on estimates from 2010 U.S. Census Tract figures, which does not provide an adequate basis to perform detailed risk assessments.

Severe Weather

The City of Santa Fe can anticipate some form of severe weather activity based upon seasonal meteorological patterns and local topographical conditions every year. It is susceptible to a full range of severe weather conditions, including high winds, substantial rainfall, thunderstorms, dangerous lightning, fog, dust storms, hail, drought, and periodic temperature extremes. *Santa Fe County data will be used with the assumption that weather in the surrounding area is what will be anticipated for the smaller geographic area of the City of Santa Fe.*

HAZARD PROFILE – THUNDERSTORMS

Hazard Characteristics

Santa Fe experiences some form of severe weather activity annually based upon seasonal meteorological patterns and local topographical conditions. It is susceptible to a full range of severe weather conditions, including high winds, substantial rainfall, thunderstorms, dangerous lightning, hail, and periodic temperature extremes. All areas of the City of Santa Fe are susceptible to severe weather conditions, although local topography, such as elevation and land contours, plays a significant part in how weather affects a particular area. At the time of storm occurrence, one portion of the City may experience severe damage while another, located nearby, escapes with minimal impact.

Thunderstorms are produced when warm moist air is overrun by dry cool air. As the warm air rises, thunderheads form and cause strong winds, lightning, hail, and heavy rains. Atmospheric instability can be caused by surface heating or by upper tropospheric (>50,000 feet) divergence. Rising air parcels also can result from airflows over mountainous areas. Generally, air mass thunderstorms form on warm-season afternoons and are not severe. The latter, dynamically-driven thunderstorms, which generally form in association with a cold front or other regional atmospheric disturbance, can become severe, thereby producing strong winds, frequent lightning, hail, downburst winds, heavy rain, and occasional tornadoes.

All areas of the state have thunderstorms. According to the National Weather Service (NWS), the thunderstorm season in New Mexico begins over the high plains in the eastern part of the state in mid- to late April, peaks in May and June, declines in July and August, and then drops sharply in September and October. In the western part of the state, thunderstorms are infrequent during April, May, and June, increase in early July and August, and then decrease rapidly in September. Over the central mountain chain, thunderstorms occur almost daily during July and August, especially over the northwest and north central mountains.

Thunderstorms may have different characteristics in different regions of the state. Across the eastern plains, thunderstorms tend to be more organized, long-lived, and occasionally severe, producing large hail, high winds, and tornadoes. Thunderstorms in the western part of the state tend to be less severe on average, occasionally producing life-threatening flash floods and small hail accumulations. Most of the storms in central and western New Mexico are associated with

the southwest monsoons, which mainly produce flash floods (see – Floods/Flash Floods subsection of this Plan for more information about flooding in the City of Santa Fe.

Lightning is defined as a sudden and violent discharge of electricity, usually from within a thunderstorm, due to a difference in electrical charges. Lightning is a flow of electrical current from cloud to cloud or cloud to ground. Nationwide, lightning causes extensive damage to buildings and structures, kills or injures people and livestock, starts forest and wildfires, and disrupts electromagnetic transmissions. Lightning is extremely dangerous during dry lightning storms because people often remain outside rather than taking shelter. To the general public, lightning is often perceived as a minor hazard. However, lightning-caused damage, injuries, and deaths establish lightning as a significant hazard associated with any thunderstorm. Damage from lightning occurs four ways:

1. Electrocution or severe shock of humans and animals;
2. Vaporization of materials along the path of the lightning strike;
3. Fire caused by the high temperatures (10,000-60,000°F); and
4. A sudden power surge that can damage electronic equipment.

Large outdoor gatherings (e.g., sporting events, concerts) are particularly vulnerable to lightning strikes. New Mexico ranks sixth in the nation in lightning fatalities with 0.55 deaths per million people annually. Lightning usually occurs as a result of thunderstorms that move through New Mexico during the summer months, with peak lightning strikes occurring in July and August. Lightning does not normally cause significant damage to property; however, it is responsible for numerous power outages and is the leading cause of weather-related injuries and fatalities in New Mexico. According to National Centers for Health Statistics (NCHS 2010) multiple-cause-of-death tapes and the Census of Fatal Occupational Injuries (CFOI 2010), New Mexico had 374 lightning related fatalities between 1995 and 2000. As published in the DHSEM Hazard Mitigation Plan (2007), New Mexico has a 100 percent probability of a lightning event every year. There is a 100 percent chance of a lightning fatality each year.

The Lightning Activity Level (LAL) is a scale from 1 to 6, which describes frequency and character of cloud-to-ground (cg) lightning (Table 17). The lightning activity level is a number developed in order to help land management and fire protection agencies prepare for the possibility of lightning-caused wildland fires. It is designed to indicate both the amount of lightning associated with thunderstorms, if there are any, as well as whether or not there will be wetting rains accompanying the storms.

Table 17: Lightning Activity Level Scale

Lightning Activity Level				
	Cloud and Storm Development	Counts cg / 5 min	Counts cg / 15 min	Average cg / min
1	No thunderstorms	-	-	-
2	Cumulus clouds are common but only a few reach the towering stage. A single thunderstorm must be confirmed in the rating area. The clouds mostly produce virga but light rain will occasionally reach ground. Lightning is very infrequent.	1-5	1-8	<1
3	Cumulus clouds are common. Swelling and towering cumulus cover less than 2/10 of the sky. Thunderstorms are few, but 2 to 3 occur within the observation area. Light to moderate rain will reach the ground, and lightning is infrequent.	6-10	9-15	1-2
4	Swelling cumulus and towering cumulus cover 2-3/10 of the sky. Thunderstorms are scattered but more than three must occur within the observation area. Moderate rain is commonly produced, and lightning is frequent.	11-15	16-25	2-3
5	Towering cumulus and thunderstorms are numerous. They cover more than 3/10 and occasionally obscure the sky. Rain is moderate to heavy, and lightning is frequent and intense.	>15	>25	>3
6	Dry lightning outbreak. (LAL of 3 or greater with majority of storms producing little or no rainfall.)	-	-	-

Source: http://www.crh.noaa.gov/bis/?n=lalinfo

Hail is occasional weather event in the City of Santa Fe. A hailstorm is a severe thunderstorm in which balls or irregularly shaped lumps of ice greater than 0.75 inches (3/4- inch) in diameter fall with rain. Hail size and hailstorm intensity is measured on the TORRO Scale (Table 18). The size of the hail is directly related to the size and severity of the storm. As a hail storm develops, ice crystals form in a low-pressure front due to rapidly rising warm air into the upper atmosphere and subsequent cooling of that air mass. Water droplets freeze to the surface of the ice crystal, gradually increasing their size and weight. When the ice crystals become too heavy to remain aloft, they fall as precipitation.

Severity and Probability of Occurrence

The NWS definition of a severe thunderstorm is a thunderstorm that produces any of the following: downbursts with winds of 58 miles per hour (mph) (50 knots) or greater (often with gusts of 74 mph or greater), hail 0.75 of an inch in diameter or greater, or a tornado. Typical thunderstorms can be three miles wide at the base, rise to 40,000-60,000 feet into the troposphere, and contain half a million tons of condensed water. Severe thunderstorms are reported each year in the City of Santa Fe.

Table 18: TORRO Hailstorm Intensity Scale

Intensity Code	Intensity Category	Maximum Diameter – Inches (mm)	Description	Typical Damage Impacts
H0	Hard Hail	1/8" – 3/8" (5-9)	Pea	No damage.
H1	Potentially Damaging	3/8" – 1/2" (10-15)	Mothball	Slight damage to plants, crops.
H2	Potentially Damaging	5/8" – 3/4" (16-20)	Grape	Significant damage to fruit, crops, vegetation.
H3	Severe	3/4" – 1 1/8" (21-30)	Walnut	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored.
H4	Severe	1 1/4" – 1 1/2" (31-40)	Robin's Egg	Widespread glass damage, vehicle bodywork damage.
H5	Destructive	1 5/8" – 2" (41-50)	Golf Ball	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries.
H6	Destructive	2" – 2 3/8" (51-60)	Chicken Egg	Aircraft bodywork dented, brick walls pitted.
H7	Very Destructive	2 3/8" – 3" (61-75)	Tennis Ball	Severe roof damage, risk of serious injuries.
H8	Very Destructive	3" – 3 1/2" (76-90)	Softball	Severe damage to aircraft bodywork.
H9	Super Hailstorm	3 1/2" – 4" (91-100)	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open.
H10	Super Hailstorm	>4" (>100)	Melon	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open.

Source: http://www.torro.org.uk/site/hscale.php

PREVIOUS OCCURRENCES – THUNDERSTORMS

As recorded by NOAA's NCDC database, there were thirteen significant thunderstorm related events reported in the City of Santa Fe area from June 1996 to December 2012. Table 19 provides an overview of those events.

Table 19: Significant Severe Weather Events (Thunderstorm, Hail and Lightning) from June 1996 to December 2012

Date	Thunderstorm	Event Narrative	Damage
6/10/1996	Wind	A dry microburst or possible dust devil destroyed a porch cover and damaged the roof of a home causing $5,000 in damages	$5,000
7/09/1996	Lightning	A lightning caused fire destroyed the home of an 80 year old woman who suffered smoke inhalation.	$60,000

Date	Thunderstorm	Event Narrative	Damage
7/23/1998	Flash flood Wind	A brief heavy thunderstorm produced copious small hail and gusty winds at Santa Fe. Runoff into the Santa Fe River nearly swept away a truck. A man, rescued by a tow truck, was slightly injured. Another man was slightly injured when a large tree blew down on his construction truck.	$1,000
8/12/1998	Lightning	A 44-year old man was resuscitated by coworkers after suffering a near fatal, single lightning strike while working on a church roof.	Unknown
8/30/1998	Lightning	A 30-year old man was struck by lightning when he left his residence as a thunderstorm faded.	Unknown
7/29/2000	Wind	A strong thunderstorm produced copious small hail and gusty winds of near 55 mph which downed several small trees near Santa Fe.	Unknown
7/07/2003	wind	Several gustnadoes were reported either beneath developing convective clouds or near the edges of virga showers that formed over the upper Rio Grande Valley from Santa Fe south to Albuquerque during unusually hot afternoon conditions. Other strong dust devils and dry micro bursts were observed across the region also, but very little lightning was detected.	Unknown
7/14/2006	Wind	High winds of 52 kts.reported	Unknown
8/17/2006	Lightning	Two men in their 20s were struck by lightning while standing on rebar rods at a Santa Fe construction site. One man recovered immediately, but the other had to be revived with CPR.	Unknown
7/24/2007	Lightning	Lightning struck a tree in the yard of a Santa Fe residence. The shock wave from the strike shattered two windows in the house.	$2,000
12/01/2007	Wind	Horse stalls, trailers and bleachers were blown over near Rodeo Rd and Richards Ave. A light tower was completely bent over. Truck windows were broken out and a chain link fence was ripped from its posts.	$100,000
7/30/2009	Hail	1 inch of hail was reported in the Santa Fe area.	Unknown
10/20/2009	Wind	A potent storm system moved across southern California and Nevada, into Arizona and eventually New Mexico. Winds of 60 kts were reported in Santa Fe.	Unknown
7/12/2013	Lightning	A classic car show, music and the warm summer evening had drawn a large number of people to the Santa Fe Old Town Plaza. Music was playing and the downtown Santa Fe Plaza was crowded shortly before 6 p.m. on July 12, 2013 when lightning struck a cottonwood tree on the park's	

Date	Thunderstorm	Event Narrative	Damage
		northeast corner. Some were sitting on a bench under the tree when it was struck, according to witnesses. The lightning bolt curled around the tree's trunk and sent branches and slivers of wood flying like confetti on by stander stated. At least one man was cut by some of the flying wood debris, and another suffered some breathing problems initially, but no one was seriously injured according to Santa Fe Fire Department Battalion. According to those at the plaza, the force of the lightning shook the ground so hard, you could feel it through your feet. The shock wave rippled a couple of blocks away. Meanwhile, lightning continued to strike in the Sangre de Cristo Mountains east of the city in the evening. Flash flood warnings were issued by the National Weather Service for areas near recent wildfires in the mountains, such as the Pecos Canyon. More than an inch of rain had fallen near Frijoles Canyon, and almost half an inch at one weather station in the Santa Fe Municipal Watershed by 5:30 p.m. Friday.	
		Total	**$168,000**

Source: NOAA's NCDC Database

VULNERABILITY ASSESSMENT—THUNDERSTORMS

Existing Community Assets

Vulnerability to the effects of severe thunder storms, lightning and hail on buildings is dependent on the age of the building (and what building codes were in effect at the time it was built), type of construction, and condition of the structure (i.e., how well the structure has been maintained).

Critical Facilities

Critical facilities are typically vulnerable to wind damage, lightning and hail due to age of construction and possible poor condition. No specific critical facilities were identified as vulnerable to strong winds, lighten or hail; however, emergency communications capabilities, which use unreliable electric and telephone services, may be vulnerable to disruption.

Most critical facilities in the City are vulnerable to the effects of severe storms, due to potential disruption of services and transportation systems as well as possible structural failure due to high winds, heightening or hail.

Summary of Hazard Identification and Vulnerability Assessment

Santa Fe experiences the range of severe weather hazards, including tornadoes, hail storms, and thunderstorms. Features like lightning, heavy rain, and high winds can damage utility infrastructure, aged or dilapidated structures, and other assets in the City of Santa Fe.

What Can Be Mitigated?

Because severe weather can affect the entire City, effective mitigation efforts should have widespread benefits. Such far-reaching efforts would include public information capabilities, warning systems, and regulations guiding new development. Upgrading and consistently enforcing building codes and addressing structural issues provide the greatest benefit for new construction. Inspections and retrofits for existing critical facilities provide effective mitigation in a developing area. Because of time and budget realities, structure-by-structure mitigation projects would not be feasible on a broad scale; upgrading vulnerable critical facilities for specific hazards is more feasible.

Data Limitations

The Santa Fe County Tax Assessor's office has not developed a detailed property database with the information necessary to determine the location and condition of manufactured homes and aged or dilapidated structures. Consequently, the Mitigation Planning Team could not determine vulnerability to high winds and other severe weather features.

HAZARD PROFILE – WINTER STORMS

Hazard Characteristics

Winter storms begin as low-pressure systems that move through New Mexico following the jet stream. These storms can be heavy snowstorms, sleet storms, ice storms, blizzards, and severe blizzards. Major winter storms and occasional blizzard conditions bring bursts of heavy snow accumulating 3 to 6 inches in short periods or one to two feet in 12 to 24 hours. Blizzard conditions develop with winds over 35-mph. Freezing rain and drizzle will create a coating of ice that is hazardous to walk or drive on. Unusually heavy ice accumulations can damage trees, buildings, and power lines and other utilities.

Winter storms may contain one or more types of hazardous weather events. Table 20 provides definitions for these different types:

Table 20: Storm Types and Descriptions

Storm Type	Description
Heavy Snowstorm	Accumulations of four inches or more in a six-hour period, or six inches or more in a twelve-hour period. The most common effects are traffic accidents; interruptions in power supply and communications; and the failure of inadequately designed and/or maintained roofing systems.
Sleet Storm	Significant accumulations of solid pellets that form from the freezing of raindrops or partially melted snowflakes, causing slippery surfaces, posing hazard to pedestrians and motorists.
Ice Storm	Significant accumulations of rain or drizzle freezing on objects (trees, power lines, roadways, etc.), causing slippery surfaces and damage from the sheer weight of ice accumulation.
Blizzard	Wind velocity of 35 miles per hour or more, temperatures below freezing, considerable blowing snow with visibility frequently below one-quarter mile, prevailing over an extended period of time.
Severe Blizzard	Wind velocity of 45 miles per hour or more, temperatures of 10 degrees Fahrenheit or lower, a high density of blowing snow with visibility frequently measured in inches, prevailing over an extended period of time.

New Mexico winters are generally mild, but occasionally winter storms produce large amounts of snow and below-freezing temperatures. The complex terrain of New Mexico, ranging from the eastern plains, to the high mountains across the northern and western regions, to the Rio Grande Valley, creates weather regimes that change quickly over relatively short distances. Highway travelers may find themselves first in light snow or rain then suddenly in heavy snow as the highway climbs through a mountain pass. The weather may be relatively mild and sunny along the Rio Grande Valley from Socorro to Albuquerque, with near blizzard conditions found across the high plains east of the central mountain chain.

The majority of the population and development in Santa Fe County are in the central and northwestern portions of the County where the average annual snowfall can exceed 40 inches per year. Snowfall in the City of Santa Fe is normally 34 inches per year and storms are generally short lived. While winter storm events in this area are usually short lived and average just a few inches of snowfall, they can cause disruption and damage to the community. School and business closures, as well as disruptions in transportation systems, electric power, telecommunications, and emergency services, are common occurrences with snowfall as minimal as two inches.

Severity and Probability of Occurrence

Winter storms can and do occur frequently in Santa Fe County, with the most severe weather occurring in the north-central and northeastern mountainous portions of the County. According to the National Climatic Data Center (NCDC) and as shown in Table 21, data collected from four computerized data collection weather stations scattered throughout the County indicates that the annual percent chance of snowfall exceeding 12" within a 24-hour period range from 0.02% at the Golden metadata station (6,698 feet above mean sea level (MSL)), to .08% at Nambe metadata station (6,056 feet above MSL). No records were available for higher elevations that would be expected to exceed 12 inches in a 24-hour period.

Table 21: Annual Percent of Snowfall

Metadata Station	0.1"	1"	2"	5"	10"	12"
Golden	5.54%	4.46%	2.74%	0.50%	0.07%	0.02%
Nambe 1	5.76%	5.31%	3.26%	0.72%	0.14%	0.08%
Stanley 1 NNE	4.94%	4.10%	2.26%	0.33%	0.02%	0.02%

Source: National Climatic Data Center (NCDC)

PREVIOUS OCCURRENCES – WINTER STORMS

There were nineteen winter storm as defined by heavy snow fall reported in the Santa Fe Metro Area between December 2009 and December 2012 by the NOAA. Table 22 provides an overview of those events.

Table 22: Significant Winter Storm Events from December 2009 - December 2012

Date	Event Narrative	Estimated Damages
12/07/2009	Winds gusts and blizzard conditions, power outages	$10,000
12/23/2009	Between 2 and 7 inches of snow fell across the Santa Fe Metro Area, with the heaviest amounts falling in the Santa Fe Foothills.	None reported
1/18/2010	Between 2 and 8 inches of snow fell across the Santa Fe Metro area. The heaviest amounts were located in the Santa Fe foothills.	None reported
1/28/2010	Snowfall averaged up to six inches across the Santa Fe Metro Area, with up to a foot in the high mountains.	None reported
2/03/2010	Areas around Santa Fe picked up between 4 and 5 inches of snow.	None reported
2/22/2010	Snowfall rates of 1 to 2 inches per hour were reported. Much of Santa Fe received between 6 and 9 inches of snow.	None reported
3/10/2010	Three to five inches of snow was common across the Santa Fe Metro Area.	None reported
3/14/2010	Widespread snow amounts of 5 to 8 inches were reported across the Santa Fe Metro Area.	None reported
3/19/2010	Five to eight inches of snow was reported across the Santa Fe Metro Area.	None reported
12/16/2010	The Santa Fe Metro area was one of the hardest hit areas from this winter storm. 6 to 10 inches of snow was common in Santa Fe. Interstate 25 was closed for a time from Santa Fe northward to Las Vegas due to treacherous driving conditions.	None reported
12/29/2010	Around 4 to 5 inches of snow fell in Santa Fe and the Santa Fe foothills	None reported
1/31/2011	Generally 3 to 4 inches of snow fell around the Santa Fe area; however, localized higher amounts up to 6 inches were reported.	None reported
2/01/2011	This event continued into February	None reported
12/22/2011	Between 2 and 4 inches of snow fell across the area.	None reported
2/03/2012	Snow that was associated with a mesoscale circulation Friday morning dropped up to 6 inches of snow over the Santa Fe Metro area.	None reported

Date	Event Narrative	Estimated Damages
12/02/2012	Heavy snow and very cold temperatures created exceptionally high snow ratios where some areas of the Sangre de Cristo Mountains reported snowfall rates of 1 to 2 inches per hour. The coldest temperatures of the season moved into the region behind this storm system. NMDOT reported difficult to severe travel conditions along portions of Interstates 25 and 40, as well as several other state highways in northeastern New Mexico. Event Narrative Snowfall amounts of 2 to 6 inches were reported.	None reported
	Total	**$10,000**

Source: NOAA's NCDC Database

VULNERABILITY ASSESSMENT—WINTER STORMS

Cold temperatures and heavy snow or ice defines winter storms. Winter storms, which are regularly experienced in New Mexico, are considered hazards when:

- ✓ Local capabilities to handle disruptions to emergency services, traffic, communications, and electric power are overwhelmed;
- ✓ Residents in isolated communities run out of basic supplies, including food and fuel;
- ✓ Livestock suffer from severe cold and lack of feed; and
- ✓ The structural systems of buildings fail.

Existing Community Assets

Vulnerability to the effects of winter storms on buildings is dependent on the age of the building (and what building codes were in effect at the time it was built), type of construction, and condition of the structure (i.e., how well the structure has been maintained). Except for a few visual observations, data for individual structures were not available for this study, so it was difficult to determine the exact number and types of structures within Santa Fe that have heightened vulnerability to winter storm snow loading. As more development occurs in the metropolitan areas, the potential for community impacts increases.

Critical Facilities

Most critical facilities in Santa Fe are vulnerable to the effects of severe winter storms, due to potential disruption of services and transportation systems as well as possible structure failure due to heavy snow loads.

Future Development Trends

Santa Fe County has estimated that more than 25,000 new home sites will be needed within the City of Santa Fe and surrounding areas to accommodate population growth. All new structures built within Santa Fe County are subject to the Uniform Building Code and as such are built to the applicable codes and are resistant to hazards such as severe winter storms. Current UBC

regulations have rigorous standards for roof loads so new structures do not measurably increase the risk associated with winter storms.

With a projected increase in the population, the potential impact of winter storms on infrastructure will increase. Impacts such as stranded motorists, delayed emergency responses due to impassable roads, and snowbound residences will likely occur with greater frequency as the City adds more residents. If new development is concentrated in established areas, this will help to minimize the increased impact of winter storms.

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HAZARD PROFILE – EXTREME COLD

Hazard Characteristics – Extreme Cold or Cold Wave

A cold wave is a weather phenomenon that is distinguished by a cooling of the air. Specifically, as used by the U.S. National Weather Service, a cold wave is a rapid fall in temperature within a 24 hour period requiring substantially increased protection to agriculture, industry, commerce, and social activities. The precise criterion for a cold wave is determined by the rate at which the temperature falls, and the minimum to which it falls. This minimum temperature is dependent on the geographical region and time of year. Cold waves generally are capable of occurring in any geological location and are formed by large cool air masses that accumulate over certain regions, caused by movements of air streams.

PREVIOUS OCCURRENCES – EXTERME COLD

The State of New Mexico experiences extreme cold events annually that may affect the City of Santa Fe. Referencing the NCDC online database are no recorded significant events for the City of Santa Fe. There are, however, have been two recent extreme cold weather events in New Mexico that have affected the citizens of Santa Fe. These events were exacerbated by a natural gas shortage.

Over the four-day period from January 31 through February 3, a strong and complex winter system resulted in several days of extremely adverse weather across northern and central New Mexico and neighboring areas. Upper level high pressure has been in place over the U.S. west coast over much of the winter. During the period from January 30 through February 3, two strong upper level disturbances deepened east of the upper high and crossed New Mexico. These two systems were accompanied by an exceptionally strong surface front resulting in snow, wind and bitter cold temperatures across New Mexico. This system crossed New Mexico on the January 31 resulting in snow that favored the northern high terrain and the northeast plains. The second system deepened over Utah on February 1 and moved slowly south of the state by February 3.

In early February, a winter storm hit the US Southwest. From January 31 to February 4, temperatures in Texas, New Mexico, Arizona and Mexico were the coldest experienced within the region since 1971. Ambient air temperatures were below-zero degrees Fahrenheit, and wind chill temperatures were consistently -20 to -30 degrees Fahrenheit. Santa Fe, New Mexico, experienced 88 consecutive hours of below-freezing temperatures.

New Mexico frequently experiences severe cold. Most of the severe cold tends to be localized and short-lived. The February severe weather was unusual in its breadth, depth and duration. Most of the moisture in the February storm occurred east of New Mexico in Texas and

Oklahoma. Conditions in New Mexico could have been much more difficult if the severe weather had included significant ice and snow.[13]

VULNERABILITY ASSESSMENT—EXTREME COLD

Existing Community Assets

Extreme cold has the potential to knock out heat, power and communications services to home and business sometimes for days at a time. Heavy snowfall and extreme cold can immobilize an entire region. Extreme winter cold often causes poorly insulated water pipes to freeze. Even some poorly-protected indoor plumbing may rupture as frozen water expands within them, causing property damage. Fires, paradoxically, become more hazardous during extreme cold. Water mains may break and water supplies may become unreliable, making firefighting more difficult. Icy roads can add to accidents and prolonged exposure to the cold can also cause harm to both humans and animals in the affected area. The elderly, disabled, and debilitated may be especially susceptible to extreme cold.

Critical Facilities

Critical facilities are susceptible to power failures and brown outs as energy supplies become stressed during an extended period of extreme cold. Firefighting and emergency response can be at risk.

Future Development Trends

Although potentially devastating to a vulnerable population an extreme cold event should not impact future development trends.

What Can Be Mitigated?

One important part of mitigating extreme cold is forecasting and warning so that people can prepare. Communities can prepare for winter storms by stockpiling sand and salt to improve road conditions, advising people to stay home or to use caution if they must go out, and recommending that people stock up on food, water, batteries, and other supplies. Snow fences in areas prone to high winds and heavy snowfall can increase roadway access and decrease emergency snow removal costs.

Severe storm activity poses a significant threat to unprotected or exposed lifeline systems. Generally, commercial power networks are very susceptible to interruption from lightning strikes, high winds, ice conditions and hail. Other utilities, including underground pipelines, may be impacted if not protected from exposure. The greatest potential benefit for effective mitigation is upgrading and consistently enforcing building codes for new construction, and inspections and retrofits for existing critical facilities.

[13] Severe Weather Event Of February, 2011 And Its Cascading Impacts On Nm Utility Service New Mexico Public Regulation Commission Informal Task Force 21 December 2011; http://www.nmprc.state.nm.us/utilities/docs/2011-12-21_Final_Report_NMPRC.pdf

Data Limitations

The Santa Fe County Tax Assessor's office has not developed a detailed property database with the information necessary to determine the location and condition of manufactured homes and aged or dilapidated structures. Consequently, the Mitigation Planning Team could not determine vulnerability to severe winter storms. Subsequent versions of this Plan will need to incorporate and respond to these data.

Climate Change: Although, according to NOAA, the decade from 2000 to 2010 was the warmest on record, and 2010 was tied with 2005 as the warmest year on record. Warmer temperatures are accompanied by other changes in weather and climate that may include colder temperatures. Many places have experienced changes in snowfall resulting in more snowfall, as well as more frequent and severe cold events.

At the local or regional level, we can expect to have some colder-than-average seasons or even colder-than-average years. For example, in the Eastern United States, the winters of 2010 and 2011 were colder than the average winters from the previous decades. In fact, extra snowy winters can be expected. In a warmer climate, more water vapor is held in the atmosphere causing more intense rain and snow storms. As the climate warms, we do expect the duration of the snow season to decrease; however, as long as it is still cold enough to snow, a warming climate can lead to bigger snowstorms (EPA.gov, 2013).

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HAZARD PROFILE – EXTREME HEAT

Hazard Characteristics – Extreme Heat or Heat Wave

Heat waves are long periods of abnormally high temperatures. There is generally no universal definition of a heat wave because of the variation within temperatures are different in geographic locations. Along with the excessive heat, they are can be accompanied by high levels of humidity. These two characteristics increase the relative temperature or heat index to dangerous levels.

Because heat waves are not visible as other forms of severe weather are, like tornadoes, and thunderstorms, they are one of the less known forms of extreme weather. This severe weather phenomenon can effect populations due to potential dehydration or hyperthermia. Heat cramps, heat expansion, heat stroke, and dehydration can result in human populations. The dried soils are more susceptible to erosion, decreasing lands available for agriculture. Outbreaks of wildfires can increase in frequency as dry vegetation has increased likeliness of igniting. The evaporation of bodies of water can be devastating to livestock and other animal populations may decline as well. Power outages can also occur within areas experiencing heat waves due to the increased demand for electricity to cool.

Extreme Heat

Extreme heat, or heat wave, is defined by the NWS as a temperature of ten degrees or more above the average high temperature for the region, lasting for several weeks. This condition is definitely a public health concern. During extended periods of very high temperatures or high temperatures with high humidity, individuals can suffer a variety of ailments, including heatstroke, heat exhaustion, heat syncope, and heat cramps.

- **Heatstroke** is a life threatening condition that requires immediate medical attention. It exists when the body's core temperature rises above 105° F as a result of environmental temperatures. Patients may be delirious, stuporous, or comatose. The death-to-care ratio in reported cases in the U.S. averages about 15%.
- **Heat exhaustion** is much less severe than heatstroke. The body temperature may be normal or slightly elevated. A person suffering from heat exhaustion may complain of dizziness, weakness, or fatigue. The primary cause of heat exhaustion is fluid and electrolyte imbalance. The normalization of fluids will typically alleviate the situation.
- **Heat syncope** is typically associated with exercise by people who are not acclimated to exercise. The symptom is a sudden loss of consciousness. Consciousness returns promptly when the person lies down. The cause is primarily associated with circulatory instability because of heat. The condition typically causes little or no harm to the individual.
- **Heat cramps** are typically a problem for individuals who exercise outdoors but are unaccustomed to heat. Similar to heat exhaustion, it is thought to be a result of a mild imbalance of fluids and electrolytes.

In an average year, extreme heat kills 175 people (*FEMA Extreme Heat Backgrounder*). Young children, the elderly, outdoor laborers, and sick people are the most likely to suffer the effects of extreme heat. The heat index measures the severity of hot weather by estimating the apparent temperature: how hot it feels (Table 23). Skin resistance to heat and moisture transfer is directly related to skin temperature, therefore the ambient temperature can be quantified by examining the relation between relative humidity versus skin temperature. If the relative humidity is higher/lower than the base value, the apparent temperature is higher/lower than the ambient temperature. In New Mexico at elevations below 5,000 feet, individual day-time temperatures often exceed 100°F during the summer months. However, during July, the warmest month, temperatures range from slightly above 90°F in the lower elevations to 70°F in the higher elevations (*Western Region Climate Center, www.wrcc.dri.edu/narratives/NEWMEXICO.htm*).

Table 23: Heat Index/Heat Disorders

Danger Category	Heat Disorders	Apparent Temperature (^{0}F)
I Caution	Fatigue possible with prolonged exposure and physical activity.	80-90
II Extreme Caution	Sunstroke, heat cramps and heat exhaustion possible with prolonged exposure and physical activity.	90-105
III Danger	Sunstroke, heat cramps and heat exhaustion likely; heatstroke possible with prolonged exposure and physical activity.	105-130
IV Extreme Danger	Heatstroke or sunstroke imminent.	>130

Source: Occupational Health and Safety Administration; http://www.osha.gov/SLTC/heatillness/heat_index/pdfs/all_in_one.pdf

New Mexico is partially an arid desert state, and summer temperatures often exceed the 100-degree mark under normal conditions. Nighttime temperatures are typically cool due to low humidity, and even though daytime temperatures may be high, people experience relief at night. Heat waves in which daily high temperatures exceed 110^o F for many days in a row are rare. Such a heat wave in the higher altitudes would probably have a more damaging effect because people would not be expecting such hot conditions. However, anywhere in the state that experienced the humidity/temperature combination could suffer ill effects from the event. A heat wave would also have a drying effect on vegetation, facilitating the ignition of wildfires. If a heat wave were coupled with a power failure, the effect on the population would be much more severe due to a lack of air conditioning. In general, it is safe to say that there is no area of the state that is immune from the hazard of heat wave.

A unique aspect to extreme heat in New Mexico is the fact that UVB radiation also increases with increasing altitude, or distance above the surface of the earth. For every 1,000 feet of altitude, the UV radiation increases by about 4 percent. This means that approximately 20

percent more UV radiation reaches the earth's surface in Santa Fe, than in a city that is at similar latitude but at sea level. This can exacerbate heat effects at high altitude.

In 1979, meteorologist R.G. Steadman developed a heat index (Table 24) to illustrate the risks associated with extreme summer heat. NOAA's heat alert procedures are based mainly on Heat Index Values. The Heat Index, sometimes referred to as the apparent temperature is given in degrees Fahrenheit. The Heat Index is a measure of how hot it really feels when relative humidity is factored with the actual air temperature.

Table 24: Heat Index as of December 2012

NOAA's National Weather Service

Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

Source: NOAA; http://www.nws.noaa.gov/os/heat/index.shtml#heatindex

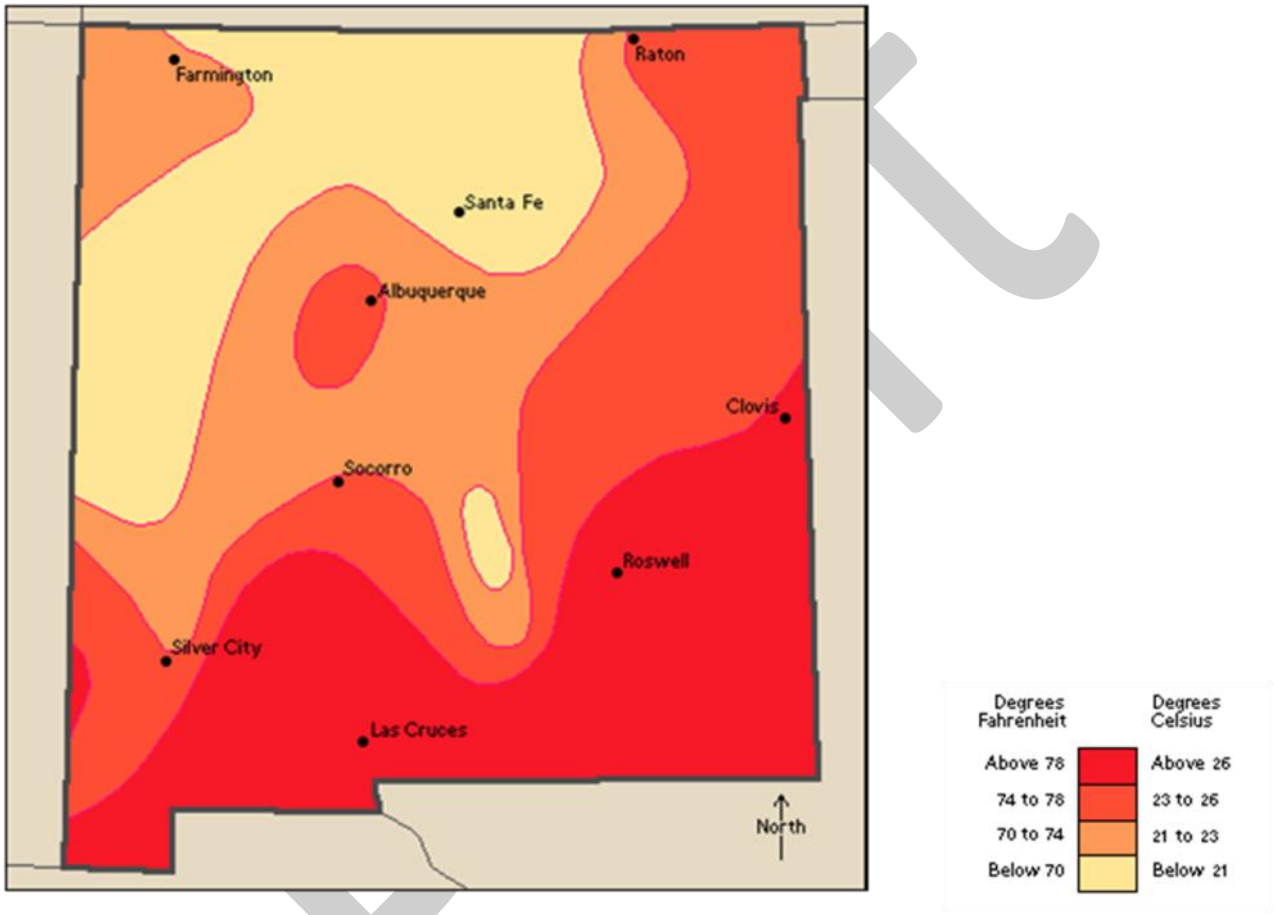
PREVIOUS OCCURRENCES – EXTERME HEAT

The State of New Mexico experiences extreme heat events annually, which affects the City of Santa Fe. Referencing the NCDC online database are no recorded significant events for the City of Santa Fe. Additionally, the MPT was unable to provide any past significant events for the City of Santa Fe. There have been recorded events for locations close to the City of Santa Fe. Those events were identified as human negligence which could occur anywhere in the state to include the City of Santa Fe, New Mexico.

Frequency

Extreme heat events are difficult to predict precisely in pattern, frequency, and degree of severity. The entire planning area would be affected by extreme heat events. Referencing the map in Figure 11, the state can experience average summer temperatures from 70 to well over 78 degrees with temperatures in the summer reaching up to 100 degrees plus. In temperatures exceeding 90°F, young children, the elderly, outdoor laborers, and sick people are the most likely to suffer from sunstroke, heat cramps, heat exhaustion, and possibly heatstroke.

Figure 11: Temperature Map of New Mexico



Source: Map shows the average temperatures for New Mexico. Information provided by World Book at www.worldbook.com

The National Weather Service – Albuquerque reported above average temperatures, month to month, for 2012 will go down as the warmest year on record. Meteorologists stated that 2012 was yet another year that supported the upward trend in temperature.

VULNERABILITY ASSESSMENT – EXTREME HEAT

Existing Community Assets

The elderly, disabled, and debilitated are especially susceptible to heat stroke. Large and highly urbanized cities can create an island of heat that can raise the area's temperature by 3 to 5° F. Therefore, urban communities with substantial populations of elderly, disabled, and debilitated people could face a significant medical emergency during an extended period of excessive heat. The highest temperature recorded in New Mexico is 122°F on June 27, 1994 at the Waste Isolation Pilot Plant (WIPP) site in Eddy County.

Critical Facilities

Critical facilities are susceptible to power failures and brown outs as energy supplies become stressed during an extended period of high heat.

Future Development Trends

Although potentially devastating to a vulnerable population an extreme heat event should not impact future development trends.

What Can Be Mitigated?

The best practices include early assessment, public education and providing cooling stations for the length of the event.

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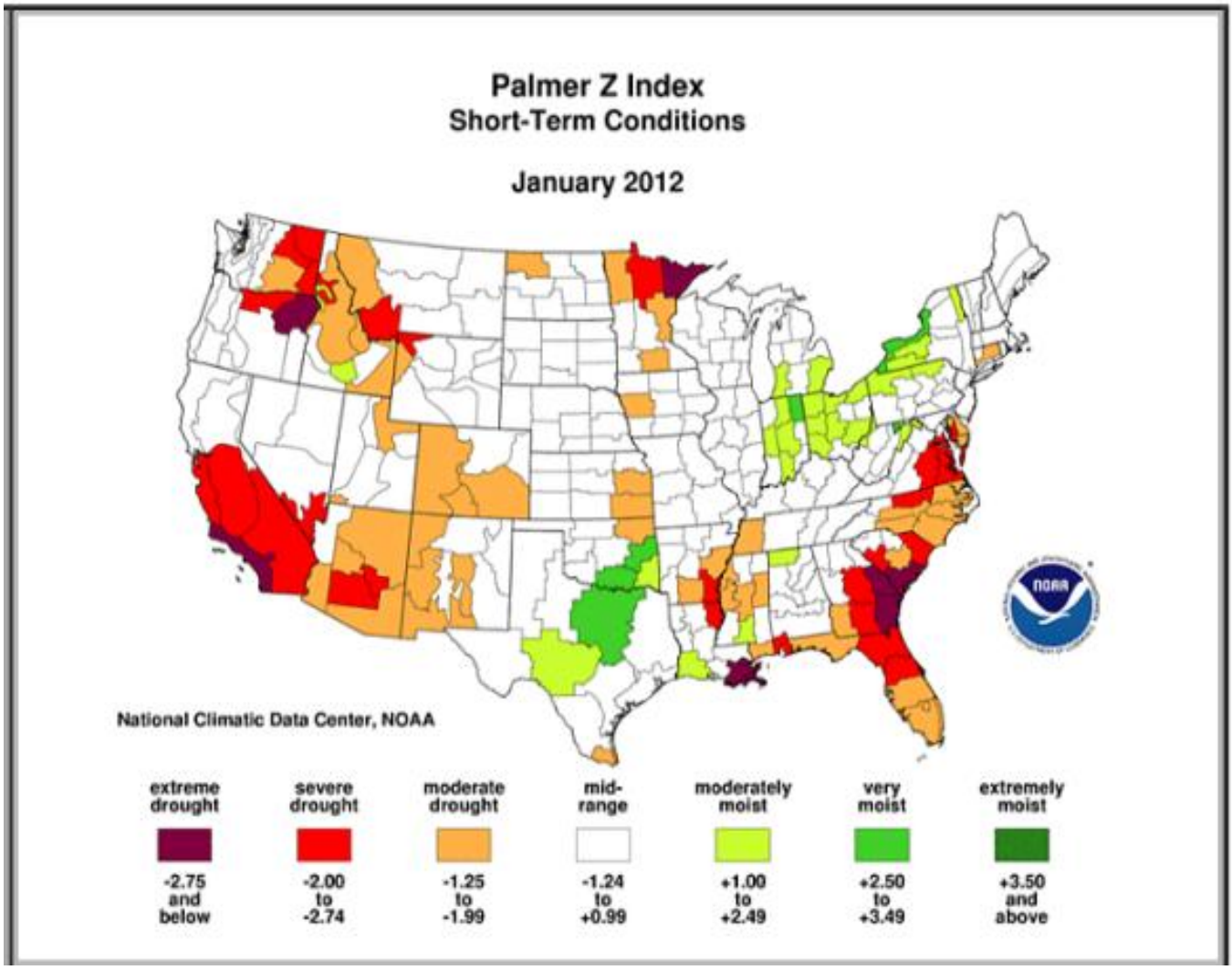
Drought

Overview – Drought in the City of Santa Fe, New Mexico

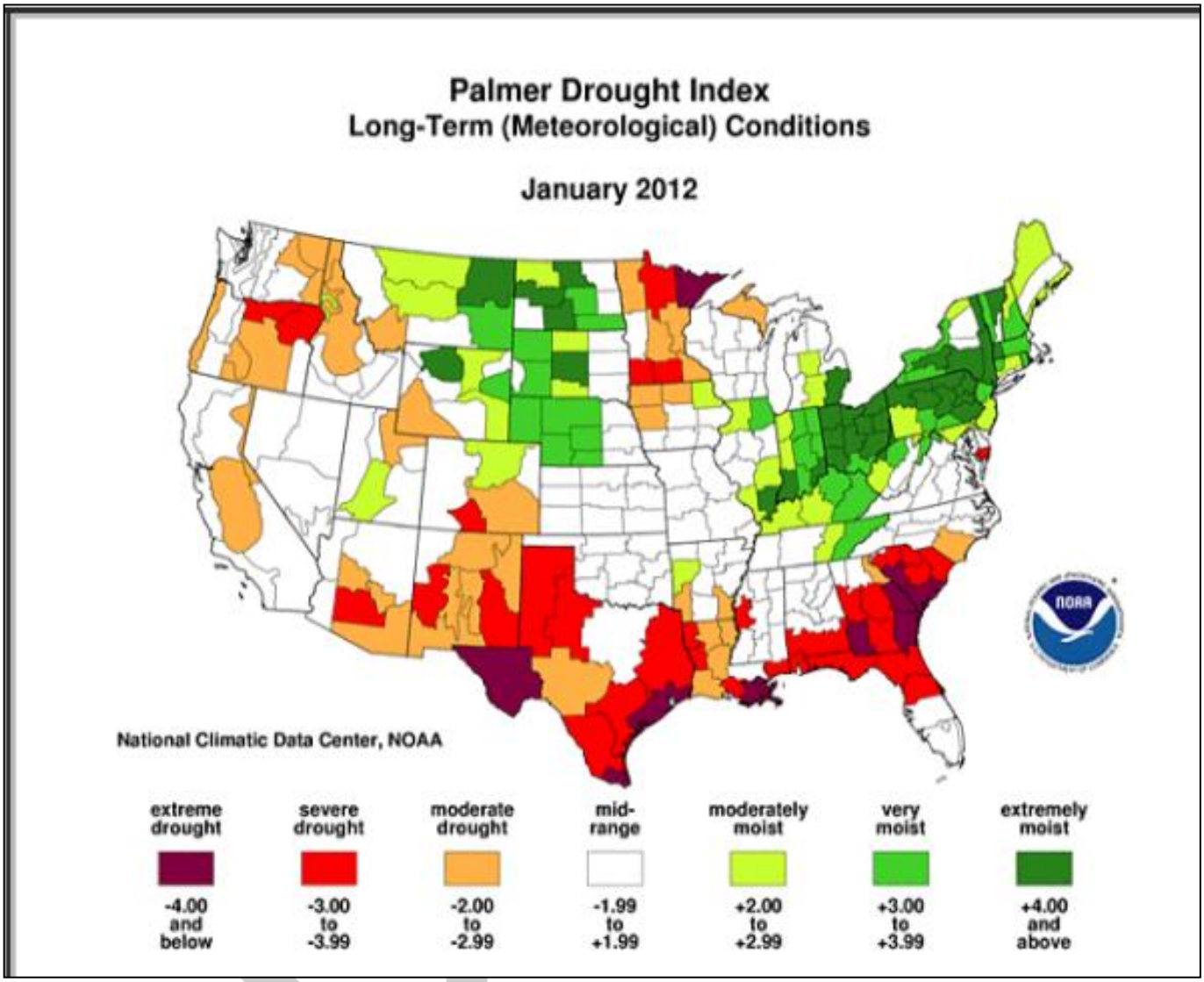
Drought, as defined by the National Oceanic and Atmospheric Administration (NOAA), is a period of abnormally dry weather that persists long enough to produce a serious hydrologic imbalance. The severity of the drought depends upon the degree of moisture deficiency, the duration, and the size of the affected area. Drought status is determined through the use of the Palmer Drought Severity Index, the Standardized Precipitation Index, and the Surface Water Supply Index. In New Mexico, drought is known to occur on an average of every ten years. Drought will always be a concern in San Juan County. Figures 12 and 13 identify the Palmer Drought Severity Index Short-Term and Long Term Conditions.

Figure 12: Palmer Drought Severity Index - Short-Term Conditions



Source: National Climatic Data Center, National Oceanic and Atmospheric Administration
http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/palmer.html

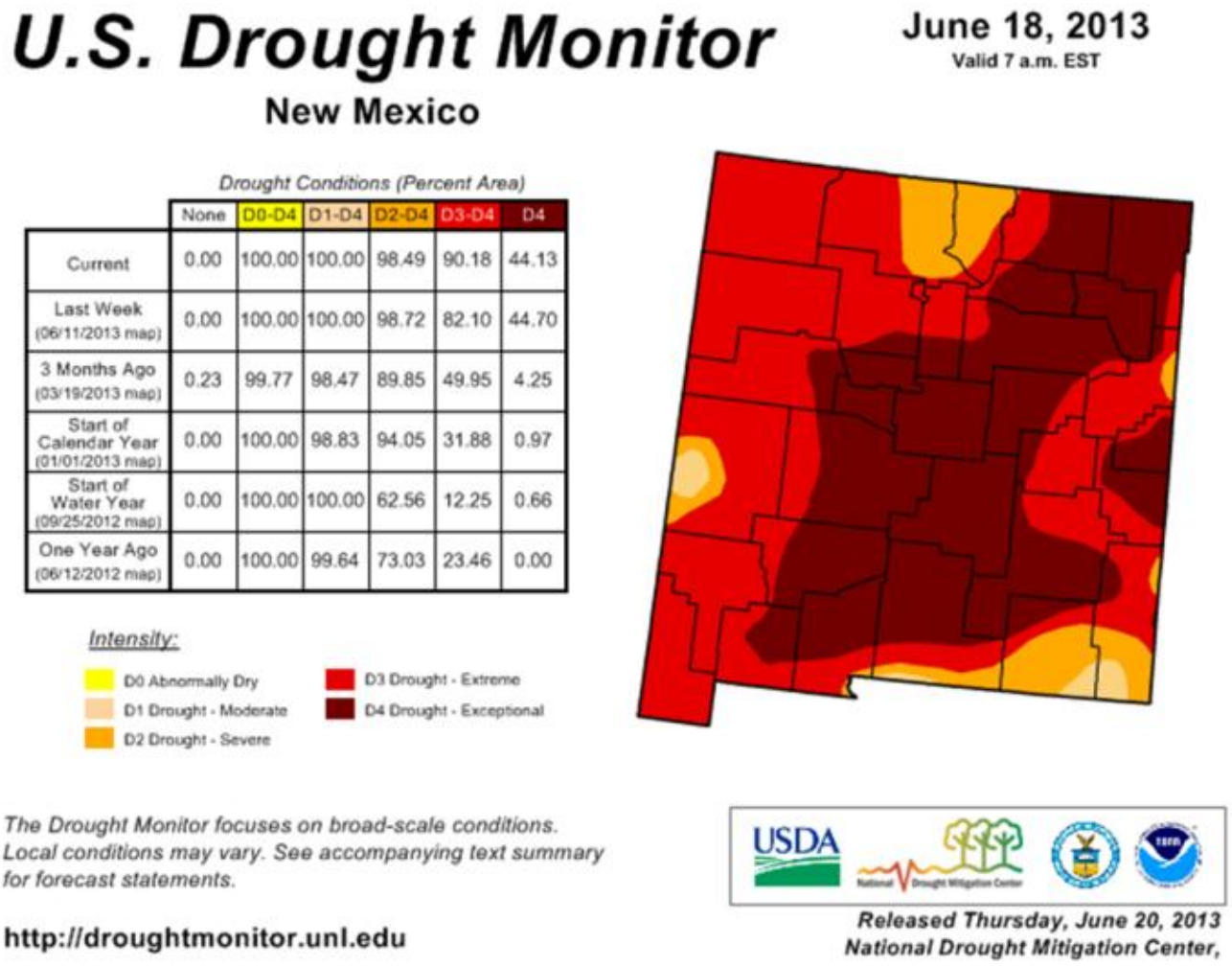
Figure 13: Palmer Drought Index - Long-Term Conditions



Source: National Climatic Data Center, National Oceanic and Atmospheric Administration
http://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/palmer.html

A drought is a period of prolonged dryness that depletes both ground and surface water. Droughts are common in New Mexico. Since drought is a regional issue drought in the City of Santa Fe will be discussed as it is it occurs in Santa Fe County. The climate in Santa Fe is arid with average annual precipitation ranges from less than 12 inches for the majority of the County up to 40 inches in the mountainous areas in the eastern part of the County, as seen on Figure 14. This normally meager annual precipitation causes extended periods of scant flow in the State's rivers, and any measurable decrease in precipitation rates can create drought conditions in a relatively short period of time.

Figure 14: New Mexico Average Annual Precipitation



Source: droughtmonitor.unl.edu/DM_state.htm?NM, June 2103

HAZARD PROFILE—DROUGHT

In New Mexico, Drought is a regular event. It visits the state in recurring cycles. Experts predict that drought conditions are likely to continue for the foreseeable future. Drought increases the probability and severity of wildfire. Drought also increases the severity of flash flooding due to soils becoming hydrophobic, repelling or incapable of dissolving in water, resulting in increased runoff and erosion. The State of New Mexico has recorded periods of drought for the past few years. In every drought, agriculture is adversely impacted, especially in non-irrigated areas such as dry land farms and rangelands. Droughts impact individuals (farm owners, tenants, and farm laborers), the agricultural industry, other agriculture related sectors, and other industries such as tourism and recreation. There is increased danger of forest and wildland fires. Loss of forests and trees increases erosion, causing serious damage to aquatic life, irrigation, and power development by heavy silting of streams, reservoirs, and rivers.

Drought is nature's way of reminding us that we live in a desert. New Mexico is entering the ninth year of a drought, which magnifies the challenge of balancing our limited water supplies with growing demand. A drought is caused by a variety of factors. Scientists who study climate changes believe that conditions in the North Atlantic Ocean and the Eastern Pacific Ocean play a significant role in determining the amount of precipitation that New Mexico and the rest of the country receive. Studies show current conditions in those two oceans are similar to conditions that existed during the severe drought of the late 1940s and 1950s in New Mexico.

Drought is a condition of climatic dryness that reduces soil moisture, water or snow levels below the minimum necessary for sustaining plant, animal, and economic systems. Drought conditions are usually not uniform over the entire state. Local and regional differences in weather, soil condition, geology, vegetation, and human influence need to be considered when assessing the impact of drought on any particular location. The most commonly used drought definitions are based on meteorological, agricultural, hydrological, and socio-economic effects.

- **Meteorological** drought is defined by a period of substantially diminished precipitation duration and/or intensity. The commonly used definition of meteorological drought is an interval of time, generally on the order of months or years, during which the actual moisture supply at a given place consistently falls below the climatically appropriate moisture supply
- **Agricultural** drought occurs when there is inadequate soil moisture to meet the needs of a particular crop at a particular time. Agricultural drought usually occurs after or during meteorological drought, but before hydrological drought and can affect livestock and other dry-land agricultural operations
- **Hydrological** drought refers to deficiencies in surface and subsurface water supplies. It is measured as stream flow, snow pack, and as lake, reservoir, and groundwater levels. There is usually a delay between lack of rain or snow and less measurable water in streams, lakes, and reservoirs. Therefore, hydrological measurements tend to lag behind other drought indicators
- **Socio-economic** drought occurs when physical water shortages start to affect the health, well-being, and quality of life of the people, or when the drought starts to affect the supply and demand of an economic product

Although different types of drought may occur at the same time, they can also occur independently of one another. Drought differs from other natural hazards in three ways. First, the onset and end of a drought are difficult to determine due to the slow accumulation and lingering of effects of an event after its apparent end. Second, the lack of an exact and universally accepted definition adds to the confusion of its existence and severity. Third, in contrast with other natural hazards, the impact of drought is less obvious and may be spread over a larger geographic area. These characteristics have hindered the preparation of drought contingency or mitigation plans by many governments.

Drought status is calculated using several indices that measure how much precipitation for a given period of time has deviated from historically established norms. The Palmer drought severity index (PDSI) is used by the U.S. Department of Agriculture (USDA) to determine allocations of grant funds for emergency drought assistance (Table 25). The Palmer index is based on the supply-and-demand concept of the water balance equation, taking into account

more than the precipitation deficit at specific locations. The PDSI provides a measurement of moisture conditions that are "standardized" so that comparisons using the index can be made between locations and months.

Table 25: Palmer Drought Severity Index

Drought Severity	Return Period (years)	Description of Possible Impacts	Drought Monitoring Indices		
			Standardized Precipitation Index (SPI)	NDMC* Drought Category	Palmer Drought Index
Minor Drought	3 to 4	Going into drought; short-term dryness slowing growth of crops or pastures; fire risk above average. Coming out of drought; some lingering water deficits; pastures or crops not fully recovered.	-0.5 to -0.7	D0	-1.0 to -1.9
Moderate Drought	5 to 9	Some damage to crops or pastures; fire risk high; streams, reservoirs, or wells low, some water shortages developing or imminent, voluntary water use restrictions requested.	-0.8 to -1.2	D1	-2.0 to -2.9
Severe Drought	10 to 17	Crop or pasture losses likely; fire risk very high; water shortages common; water restrictions imposed.	-1.3 to -1.5	D2	-3.0 to -3.9
Extreme Drought	18 to 43	Major crop and pasture losses; extreme fire danger; widespread water shortages or restrictions.	-1.6 to -1.9	D3	-4.0 to -4.9
Exceptional Drought	44+	Exceptional and widespread crop and pasture losses; exceptional fire risk; shortages of water in reservoirs, streams, and wells creating water emergencies.	less than -2	D4	-5.0 or less

*NDMC - National Drought Mitigation Center

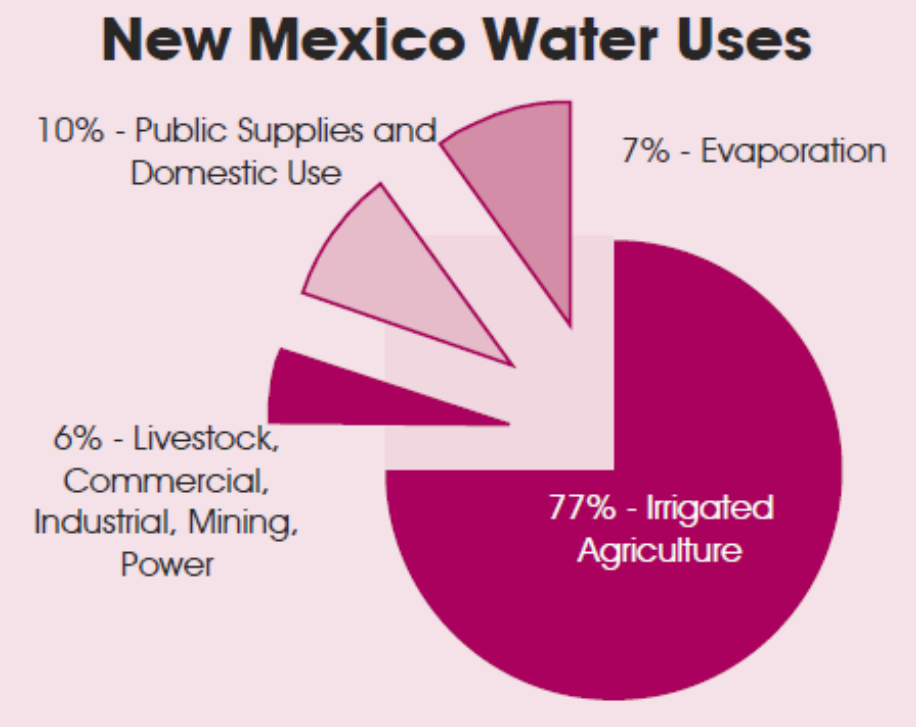
Table 27 outlines the standardized measurements of moisture conditions for use in determining the severity of drought. Information provided by NOAA at http://www.drought.noaa.gov/

New Mexico precipitation for the first ten months of 2012 was 60 percent of average and ranked as the 6th driest start to any year on record. This makes 2012 the second consecutive year with a very dry start to the calendar year for New Mexico, as 2011 began as the 2nd driest January to October period. The past 24 months have been the second driest 24 month period on record ending in October for New Mexico, just behind the period that ended in October 1956.

Water in New Mexico is distributed among a variety of users, as the following pie chart indicates (Figure 15). About 6% goes to livestock, commercial, industrial, mining, and power companies; about 10% goes to public supplies and domestic use; about 7% is lost to evaporation; and about 77% goes to irrigated agriculture. Drought is a regular event in all areas of New Mexico to include the City of Santa Fe. It visits the state in recurring cycles. Experts predict that drought

conditions are likely to continue for the foreseeable future. When drought begins, agriculture is usually first to be affected because of its heavy dependence on stored moisture in the soil. Soil moisture can be rapidly depleted during extended dry periods. Dry land farming and ranching are most at risk from drought. Impact on these activities can be seen during a short-term drought.

Figure 15: New Mexico Water Uses



Information provided by the Office of the State Engineer in the annual report for the period of 2009-2011. The PDF file is available at http://www.ose.state.nm.us/publications_index.html)

Drought increases the probability and severity of wildfire. Drought also increases the severity of flash flooding due to soils becoming hydrophobic, repelling or incapable of dissolving in water, resulting in increased runoff and erosion. Although no drought events for the City of Santa Fe have been recorded by the NCDC, the State of New Mexico has recorded periods of drought for the past few years. In every drought, agriculture is adversely impacted, especially in non-irrigated areas such as dry land farms and rangelands. Droughts impact individuals (farm owners, tenants, and farm laborers), the agricultural industry, other agriculture related sectors, and other industries such as tourism and recreation. There is increased danger of forest and wildland fires. Loss of forests and trees increases erosion, causing serious damage to aquatic life, irrigation, and power development by heavy silting of streams, reservoirs, and rivers.

Drought status is calculated using several indices that measure how much precipitation for a given period of time has deviated from historically established norms. The Palmer drought severity index (PDSI) is used by the U.S. Department of Agriculture (USDA) to determine

allocations of grant funds for emergency drought assistance (Table 26). The Palmer index is based on the supply-and-demand concept of the water balance equation, taking into account more than the precipitation deficit at specific locations. The PDSI provides a measurement of moisture conditions that are "standardized" so that comparisons using the index can be made between locations and months.

Table 26: Palmer Drought Severity Index

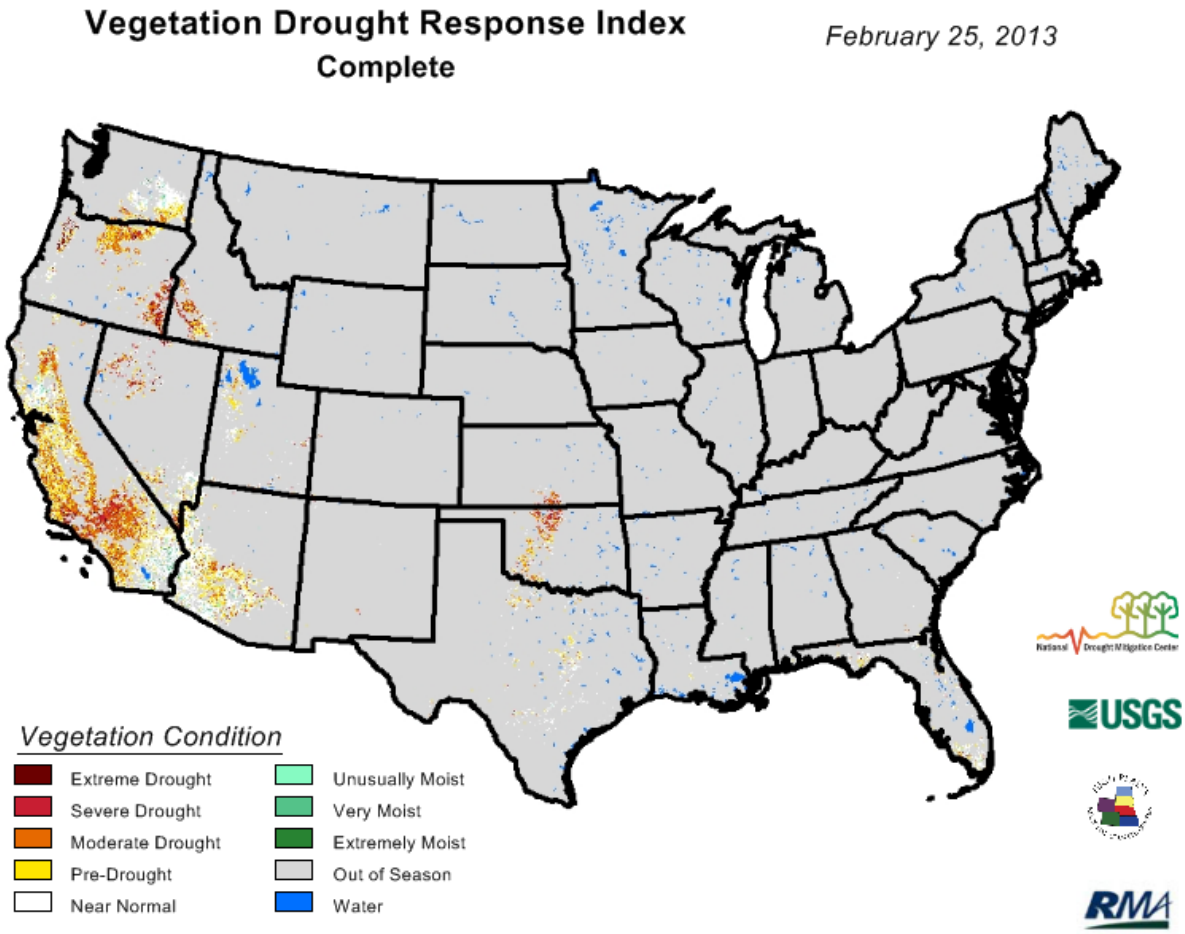
PDSI Classifications	
4.00 or more	Extremely Wet
3.00 to 3.99	Very Wet
2.00 to 2.99	Moderately Wet
1.00 to 1.99	Slightly Wet
0.50 to 0.99	Incipient Wet Spell
0.49 to -0.49	Near Normal
-0.50 to -0.99	Incipient Dry Spell
-1.00 to -1.99	Mild Drought
-2.00 to -2.99	Moderate Drought
-3.00 to -3.99	Severe Drought
-4.00 or less	Extreme Drought

Source: htpp://drought.unl.edu/whatis/indices.htm

According to the New Mexico Drought Plan, the latest predictions call for a deepening of the drought in the next few years, even though 2006 was one of the wettest years on record. One final measurement of drought, though highly temporal, is the Vegetation Drought Response Index (VegiDRI) which is available for two-week intervals (Figure 16). The Vegetation Drought Response Index, or VegDRI, is a computer modeling and monitoring method that provides continuous drought information over large regions and supplies finer spatial detail than other commonly used drought indicators. The index is available at two-week intervals across the conterminous 48 states of the United States.

This resource can be used by anyone monitoring agricultural conditions, particularly ranching, or with interests in natural resource management. Data provides a regional overview with enough definition to know how specific rangelands and crops are doing. VegDRI integrates time-series observations of vegetation with climate, land cover-land use type, ecological setting, and soil characteristics to show drought's effect on vegetation at a 1-kilometer resolution. The massive remote sensing archives at the U.S. Geological Survey Earth Resources Observation and Science Center (USGS-EROS) supply historical satellite data from the last 20 years that are critical in establishing a sound comparison of normal conditions over a longer historical period.

Figure 16: Vegetation Drought Response Index (VegiDRI)



Source: http://www.drought.unl.edu/monitor/monitor.htm

PREVIOUS OCCURRENCES—DROUGHT

New Mexico has always known drought. Archeological records indicate that drought has led to the collapse of early civilizations in New Mexico, most notably the abandonment of Chaco Canyon by the Anasazi around 1300 A.D. (Annenberg/CPB Learner.Org). In the last 100 years, New Mexico has suffered from four devastating periods of drought; 1900-1910, 1931-1941, 1942-1956, and 1974-1979. The last short duration drought was in 1996 (New Mexico Drought Task Force, May 2002). Due to the cyclical nature of droughts in New Mexico the county will enter into another period of drought. The U.S. Geological Survey (USGS) has established gauging at many waterway locations to gather data on annual stream flows. Three locations around Santa Fe County were examined for times of low stream flows, indicating a drought period. The gauging station data vary between the locations but generally show drought

periods during the approximate periods of 1930–1936, 1946–1956, and 1969–1977. One station along the Rio Grande contained data back to 1896 and a low stream flow period is indicated at the station from approximately 1898-1902. See gauging station data at http://waterdata.usgs.gov/nm/nwis/annual.

Vulnerability Assessment Drought

Existing Community Assets

When droughts occur, they can have significant consequences for public and rural water supplies, human and livestock consumption, water quality, natural soil water or irrigation water for agriculture, forests, wild land fire fighting, and navigation and recreation. Those who rely on surface water (reservoirs and lakes) and subsurface water (ground water), for example, are usually the last to be affected. A short-term drought that persists for three to six months may have little impact on these sectors, depending on the characteristics of the hydrologic system and water use requirements. For droughts of longer duration, impacts may disappear quickly in the agricultural sector, because rain quickly replenishes soil moisture, but linger for months or even years in other sectors dependent on stored surface or subsurface supplies. Ground water users, often the last to be affected by drought during its onset, may also be last to experience a return to normal water levels. The length of the recovery period is a function of the intensity of the drought, its length, and the quantity of precipitation received as the drought ends.

Critical Facilities

Critical facilities, in particular fire-fighting facilities, must have reliable access to water for fire suppression. Droughts can impact their access to sufficient quantities of surface water and ground water. Other critical facilities such as schools and hospitals may experience restrictions on potable water consumption during periods of severe drought.

Future Development Trends

As business and population growth continues in Santa Fe, the potential impacts of prolonged drought grow significantly. Continued residential housing and commercial development in Santa Fe and the surrounding areas will be difficult to sustain with the limited water resources currently available and may require additional water rights and drilling new production wells. A continuation of the current drought and lower water tables will require deeper wells for existing production. Deeper groundwater also requires more intensive treatment to filter out arsenic and minerals. With or without a prolonged drought, agricultural users of water in the County will come under increasing pressure to sell or lease water rights to developing urban areas.

Santa Fe County and the City of Santa Fe have been proactive in addressing the limited water sources of the County. Beginning in 1980, the County completed the first Santa Fe County Growth Management Plan that emphasizes carefully controlled growth with a special respect for water availability. New residential subdivisions in the County must be able to demonstrate a 75-year supply of water for projected water demand as a condition of approval. As detailed below, the County has taken several measures in recent years to reduce overall water consumption and to mandate water conservation during periods of drought.

CONCLUSIONS—DROUGHT

Summary of Hazard Identification and Vulnerability Assessment

All of the City of Santa Fe, to include the county, is currently in an emergency drought situation. The consequences of a drought on the arid climate of Santa Fe County are quickly felt. Agriculture and ranching dependent on rainfall are affected within weeks of reduced precipitation. A moderate to severe drought threatens groundwater supplies that most of the County's residents rely upon for potable water.

A prolonged drought also increases the probability of other hazards. Forests become more susceptible to wildfires and native vegetation dies, leaving exposed soils susceptible to erosion, flash flooding, and dust storms. The Mitigation Planning Team has identified drought as a priority hazard in the City of Santa Fe.

What Can Be Mitigated?

The best practices include early assessment, public education and water conservation programs. Identifying the first phases of the drought and reacting with water conservation at the earliest time will help to mitigate drought later in the disaster. In the future, there is also the potential for limiting population growth and development dependent on groundwater. Mitigation management for drought is a proactive process. However, most of the process has been at the state level since there is no U.S. water conservation or drought policy.

In response to the ongoing threat on drought and water shortages to the City of Santa Fe, the City has made significant efforts to reduce water use through the replacement of water-hogging toilets, appliances, and landscape with lower consumptive models have resulted in a significant reduction of household water consumption. City water conservation programs have resulted in a drop from 137 gallons per person per day to 103 gallons over a seven-year period.[14]

This City's Water Conservation Office is responsible for implementing other water conservation measures including citizen outreach and education. This office is guided by the City's Water Conservation Committee who recommend policy and evaluate specific programs related to water conservation. Current water conservation programs include:

- Toilet Retrofit Program
- Rebate Programs for water efficient appliances
- Pre-rinse Spray Nozzle Program
- Moisture Sensors & ET Controllers
- Residential Surveys, Leak Investigation & Landscape Audits
- City of Santa Fe & Homewise "*Watersmart Project*"
- Public Outreach & Education
- Commercial Landscapers Outreach

[14] Santa Fe Water Conservation Plan http://www.santafenm.gov/index.aspx?NID=1366

- Compliance and Enforcement

Actions Included in the Plan:

- Develop a "Water Conservation Strategic Plan"
- Expand Rebates and Incentive Programs
- Adopt New Technologies to better track water use and then help customers to conserve more easily.
- Improve billing system to better track supply-side infrastructure and water use by customers as well as to validate the effectiveness of new conservation measures.
- Monitor water use with Fire Flies and Kopy Caps
- Broaden the use of, and consider requiring, a variety of water saving appliances:
- Reduce unnecessary public and private landscape watering
- Proactively Plan and Run Tests to Identify Leaks
- Expand existing residential leak investigation/survey program to include other water customer sectors.
- Expand Public Outreach and Education (see Section 11, Education and Outreach)
- Require Irrigation Certification from the New Mexico Irrigation Association for some irrigation installations
- Improve the City website to include water conservation information for residential and commercial customers that is both useful and interactive.
- Create and maintain public demonstration gardens throughout the City.
- Develop a Strong Compliance and Enforcement Program
- Expand Support for Water Conservation Activities
- Initiate a Program to Maximize Water Harvesting
- Initiate a Program to Process and Utilize Water for Multiple Purposes
- Continue and increase the use of treated effluent.
- Consider the energy requirements of any potential new water sources and seek opportunities to use clean, renewable energy sources for the energy requirements

Climate Change

According to NOAA, the decade from 2000 to 2010 was the warmest on record, and 2010 was tied with 2005 as the warmest year on record. Warmer temperatures are accompanied by other changes in weather and climate. Many places have experienced changes in rainfall resulting in more intense rain, as well as more frequent and severe heat waves (EPA.gov, 2013).

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Manmade Hazards

Human-caused hazards include technological hazards (e.g., hazardous material releases) and terrorism. Both of these are distinct from natural hazards in that they result directly from the actions of people. The term technological hazard refers to incidents that can arise from human activities such as the manufacture, storage, transportation, and use of hazardous materials. Technological hazards are assumed to be accidental and their consequences unintended. The term terrorism, on the other hand, encompasses intentional, criminal and malicious acts involving weapons of mass destruction (WMDs), including biological, chemical, nuclear, and radiological weapons; arson, incendiary, explosive, and armed attacks; industrial sabotage and intentional hazardous material releases; and cyber-terrorism (attacks via computer). Technological and terrorism hazards are interrelated in that facilities and transportation routes that handle hazardous materials may be potential targets.

The focus of this section addresses three types of human-caused hazards that are relevant to the City of Santa Fe: hazardous material releases, terrorism, and nuclear/radiological accidents. Hazardous materials can include toxic chemicals, radioactive materials, infectious substances, and hazardous wastes. An accidental hazardous material release can occur wherever hazardous materials are manufactured, stored, transported, or used. Such releases can affect the nearby population and contaminate critical or sensitive environmental areas.

Facilities that use, manufacture, or store hazardous materials in New Mexico must comply with Title III of the federal Superfund Amendments and Reauthorization Act (SARA), also known as the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA)[15] and the State's reporting requirements under the Hazardous Chemical Information Act [74-4E-1 to 74-4E-9 NMSA 1978]. The community right-to-know reporting requirements keep communities abreast of the presence and release of chemicals at individual facilities.

Key information about the chemicals handled by manufacturing or processing facilities is contained in the U.S. Environmental Protection Agency's (U.S. EPA's) Toxic Release Inventory (TRI) database. The TRI is a publicly available EPA database that contains information on toxic chemical releases and waste management activities reported annually by certain covered industry groups as well as federal facilities. This inventory was established under EPCRA and expanded by the Pollution Prevention Act of 1990. Facilities that exceed certain threshold levels must report TRI information to the U.S. EPA, the federal enforcement agency for SARA Title III, and the NMOEM.

[15]In 1986, Congress reauthorized and expanded the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The new act is known as the Superfund Amendments and Reauthorization Act (SARA). Title III of SARA addresses emergency planning and community right-to-know reporting on hazardous and toxic chemicals. The purpose of SARA Title III is to promote greater cooperation among government, industry, and citizens to prevent, plan and prepare for, and manage chemical emergencies. SARA Title III has four major components: emergency planning (Section 301 to 303); emergency release notification (Section 304); hazardous chemical inventory (Sections 311 & 312); and toxic chemical release inventory (Section 313).

EPCRA's primary purpose is to inform communities and citizens of chemical hazards in their areas. Sections 311 and 312 of EPCRA require businesses to report the locations and quantities of chemicals stored onsite to state and local governments in order to help communities prepare to respond to chemical spills and similar emergencies. EPCRA Section 313 requires the EPA and the states to collect data annually on releases and transfers of certain toxic chemicals from industrial facilities, and to make the data available to the public in the TRI. In 1990, Congress passed the Pollution Prevention Act, which required that additional data on waste management and source reduction activities be reported under TRI. The goal of TRI is to empower citizens, through information, to hold companies and local governments accountable in terms of how toxic chemicals are managed.

HAZARD PROFILE—HAZARDOUS MATERIAL RELEASES

Hazard Characteristics

Hazardous material releases can occur at facilities (fixed sites) or along transportation routes. They can occur as a result of human carelessness, intentional acts, or natural hazards. When caused by natural hazards, these incidents are known as secondary hazards. Hazardous material releases, depending on the substance involved and type of release, can directly cause injuries and death and contaminate air, water, and soils. The probability of a release at any particular facility or at any point along a known transportation corridor is relatively low. However, the consequences of releases of these materials can be very serious.

There are 142 facilities in Santa Fe that submitted Tier II reports. Facilities are required to submit Tier II reports if they store a hazardous substance exceeding 10,000 pounds or any extremely hazardous substance exceeding either 500 pounds or the threshold planning quantity (TPQ), whichever is less. The Tier 2 facilities are required to report annually to the State Emergency Response Commission, Local Emergency Planning Committees, and local fire departments for emergency planning. TRI facilities are those facilities in specific industries that manufacture, process, or use more than the threshold amount of one or more of 600 listed toxic chemicals. Most threshold amounts are 10,000 or 25,000 pounds per year, but can vary depending on the chemical.

Severity and Probability of Occurrence

The severity of the incident varies with the distance from the release and the time elapsed. The most immediate areas are generally at greatest risk yet, depending on the agent, a release can travel great distances or exist over a long time (e.g., nuclear radiation), resulting in far-reaching effects to people and the environment.

With a hazardous material release, whether accidental or intentional, there are several potentially exacerbating or mitigating circumstances that will affect the severity of the release. Exacerbating conditions can enhance or magnify the effects of a hazard. Mitigating conditions, on the other hand, can reduce the effects of a hazard. These conditions include:

- Weather conditions that can affect how the released material is dispersed (e.g., high winds can increase the spread of gases or radioactive materials);

- How the chemical was released (e.g., explosion, volatilization, air or water release) and the nature of the substance;
- Micro-meteorological effects of buildings and terrain that can alter travel and duration of agents;
- Shielding in the form of sheltering in-place (staying indoors during an emergency) that protects people and property from harmful effects; and
- Non-compliance with applicable codes (e.g. fire and building codes) and maintenance failures (e.g., fire protection and containment features) that can substantially increase the damage to the facility and surrounding buildings.

While hazardous material releases in Santa Fe have occurred in the past, they are considered difficult to predict. An occurrence is largely dependent upon the accidental or intentional actions of a person or group (note: intentional acts are addressed under the subsection concerned with "*Terrorism*").

PREVIOUS OCCURRENCES—HAZARDOUS MATERIAL RELEASES

There are 142 hazardous materials facilities and two major transportation routes in Santa Fe. The County has experienced hazardous material release accidents both at facilities and along transportation corridors. No SARA Title III facilities in Santa Fe County filed TRI reports. However, 30 hazardous materials releases were reported to the National Response Center for Santa Fe County between 1991 and 2002. A total of 18 releases were reported within the City of Santa Fe.

VULNERABILITY ASSESSMENT—HAZARDOUS MATERIAL RELEASES

Existing Community Assets

Table 27 indicates the number of people, as determined from the 2010 Census, that live within either a ½ mile or 1 mile radius of known SARA Title III facilities in the City.

Table 27: City of Santa Fe Population Location to Known Hazardous Facilities

City of Santa Fe	Within ½ mile of Facility	Within 1 mile of Facility
Structures	19,877	26,249
Population	39,760	53,440
Critical Facilities	17	24

Source: City of Santa Fe Tier II reports

Critical Facilities

Seventeen critical facilities are listed within ½ mile of a hazardous materials facility, and an additional 24 critical facilities are located within one mile of a hazardous materials facility for a

total of 41. Thirteen fire stations are located within one mile of a hazardous materials facility in the City of Santa Fe. In addition, five hospitals and seven police stations are within one mile of a hazardous materials facility.

Future Development Trends

Estimates of potential development identified vacant lots that could be developed within ½ mile of hazardous material facilities. As development continues and population density increases, hazardous materials may present an increased threat to the economic and social well being of selected areas of the City.

CONCLUSIONS—HAZARDOUS MATERIAL RELEASES

Hazardous materials can include toxic chemicals, radioactive materials, infectious substances, and hazardous wastes. Accidental hazardous material release can occur wherever hazardous materials are manufactured, stored, transported, or used. Such releases can affect the nearby population and contaminate critical or sensitive environmental areas. Anticipated population growth and related residential and commercial development within the City will expose an increasing population to the possibility of hazardous materials (hazmat) emergencies. Due to population density of Santa Fe, emergency hazmat response will continue to be difficult in isolated or remote areas of the County.

What Can Be Mitigated?

Individual facilities and transportation companies are responsible for maintaining facilities and operations in a safe manner. Regulation of these companies is beyond the responsibility of City-level government. However, the local community can become more involved and informed about specific aspects of these operations and in so doing, determine areas where mitigation actions may be possible such as public education, evacuation drills and response exercises, warning systems, etc. In addition, future development can be guided in such a way that new facilities and anticipated development patterns have limited overlap.

Data Limitations

The Mitigation Planning Team needs more information about past hazardous material releases from fixed sites and vehicles transporting hazardous materials, the nature of the operations that already exist in the City, and the status of existing emergency action plans.

OVERVIEW – TERRORISM IN THE CITY OF SANTA FE, NEW MEXICO

Following a number of serious international and domestic terrorist incidents during the 1990s and early 2000s, citizens across the U.S. paid increased attention to the potential for deliberate, harmful actions by individuals or groups. There is no single, universally accepted definition of terrorism. However, terrorism is defined in the Code of Federal Regulations as "...the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives" (28 CFR, Section 0.85).

HAZARD PROFILE – TERRORISM

Hazard Characteristics

The Federal Bureau of Investigation (FBI) further characterizes terrorism as either domestic or international, depending on the origin, base, and objectives of the terrorist organization. However, the origin of the terrorist or person causing the hazard is far less relevant to mitigation planning than the hazard itself and its consequences. For the purposes of this Plan, "terrorism" refers to the use of WMDs, including biological, chemical, nuclear, and radiological weapons; arson, incendiary, explosive, and armed attacks; industrial sabotage and intentional release of hazardous materials; and "cyber-terrorism." Within these general categories, however, there are many variations, particularly in the area of biological and chemical weapons, which comprise a wide variety of agents and delivery systems.

Terrorist methods can take many forms, including:

- Agriterrorism
- Armed attack
- Arson/incendiary attack
- Biological agent
- Chemical agent
- Conventional bomb
- Cyber terrorism
- Hazardous material release (intentional)
- Nuclear bomb
- Radiological agent ("dirty bomb")

Severity and Probability of Occurrence

The severity of terrorist incidents depends on the method used; the proximity of the device to people, animals, or other assets; and the duration of exposure to the incident or device. For example, chemical agents are poisonous gases, liquids, or solids that have toxic effects on people, animals, or plants. Many chemical agents can cause serious injuries or death.

Biological agents are organisms or toxins that have illness-producing effects on people, livestock, and/or crops. Because some biological agents cannot be easily detected and may

take time to incubate, it may be difficult to know that a biological attack has occurred until victims display symptoms. In other cases the effects are immediate. Those affected by a biological agent require immediate medical attention. Some agents are contagious, and victims may need to be quarantined.

An important consideration in estimating the likelihood of a terrorist incident is the existence of facilities, landmarks, or other buildings of national importance. While the City of Santa Fe has many notable landmarks from a local historic perspective, it does not contain any sites with national symbolism, or an extensive area of dense urban population; therefore, the likelihood of a terrorist attack because of the City's national significance is unlikely. However, terrorism takes many forms, and terrorists have a wide range of local, state, and national political interests or personal agendas, meaning that even unlikely potential targets cannot be ruled out.

PREVIOUS OCCURRENCES – TERRORISM

Sometime in the late 1980s, a bomb was discovered and removed without damage from a propane facility on Airport Road located next to a police station. A radical Puerto Rican group claimed responsibility for the act.

VULNERABILITY ASSESSMENT – TERRORISM

Existing Community Assets

Facilities and populations vulnerable to terrorist attacks in the City of Santa Fe have been identified as infrastructure, emergency response facilities, hospitals, government offices historical buildings, and special events. The Santa Fe Emergency Manager has identified the most vulnerable locations within the City.

Critical Facilities

All individual critical facilities are listed as vulnerable to terrorism. The City of Santa Fe is also the capital for the State of New Mexico and houses a number of state government facilities. However, government facilities, as well as other vulnerable privately owned facilities have constructed physical barriers and increased security measures. The City of Santa Fe maintains the list at its Emergency Operations Office.

Future Development Trends

Future development does not necessarily increase vulnerability beyond the basic issue identified under Hazardous Material Releases; more development in proximity to known sources of potential intentional releases increases the number of people and property subject to the existing level of vulnerability.

CONCLUSIONS – TERRRORISM

Summary of Hazard Identification and Vulnerability Assessment

Human-caused hazards are difficult to predict. Terrorists can target any historic structures, popularly attended events, critical facilities, or agricultural lands. There are 142 hazardous material facilities within Santa Fe, many within relatively densely populated areas. Trucks

transport hazardous materials along two major highways that intersect the County, I-25 and U.S. 284/85. These roads run through the most populated areas of the County. The Waste Isolation Pilot Plant (WIPP) site is located 26 miles southeast of Carlsbad, New Mexico. The WIPP Route from Los Alamos National Laboratory follows NM 502 to where it intersects with U.S. 285/84 south through Santa Fe County. WIPP is a salt mine designed for the permanent disposal of transuanic wastes (or TRU wastes) generated from defense-related activities (i.e., research and development of nuclear weapons). TRU wastes include laboratory clothing, tools, plastics, rubber gloves, wood, metals, glassware, and solidified waste contaminated with man-made radioactive materials including plutonium, americium, and neptunium. As of August 2003 56 shipments TRU shipments have passed through Santa Fe County.

What Can Be Mitigated?

Due to the uncertainty about where and when attacks can occur, much of the current effort by local emergency management agencies is focused on improving response and recovery capabilities in the event that an event occurs. The State of New Mexico is divided into six Preparedness Areas. While each Preparedness Area works collaboratively to identify risks and vulnerabilities, the City of Santa Fe annually completes a Threat and Hazard Identification and Risk Assessment (THIRA) as described in the Federal Emergency Management Agency's Comprehensive Preparedness Guide (CPG) 101. A copy of the most current THIRA for the city of Santa Fe is available through the City of Santa Fe Office of Emergency Management.

Determining the probability of terrorist attacks is difficult, as discussed above. Methods for calculating such probabilities are either being developed or, if available, are not widely accessible to communities. Knowing this information would allow communities to better focus mitigation resources with regard to critical facilities

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OVERVIEW – NUCLEAR/RADIOLOGICAL ACCIDENTS IN THE CITY OF SANTA FE (SANTA FE COUNTY), NEW MEXICO

The term "nuclear facilities" encompasses all nuclear power plants, nuclear research facilities, uranium and plutonium mining and processing operations, and military installations with nuclear weapons on site. Nuclear facilities are present in virtually every state, including New Mexico. The closest nuclear facility to Santa Fe is in neighboring Los Alamos County, at the Los Alamos National Laboratory (LANL). LANL is a part of the National Nuclear Security Administration of the U.S. Department of Energy. The central mission of LANL is enhancing the security of nuclear weapons and nuclear materials worldwide through stewardship and management of the nation's nuclear stockpile. The City of Santa Fe lies outside the standard planning area designated for nuclear emergencies, although Santa Fe would likely receive evacuation traffic.

PREVIOUS OCCURRENCES – NUCLEAR / RADIOLOGICAL ACCIDENTS

Between 1945 and 1982, there were eight nuclear related events in New Mexico. None of the events occurred in Santa Fe; however, five occurred at nearby LANL (see Table 28).

Table 28: Previous Nuclear/Radiological Related Events in New Mexico

Date	Type of Event
August 21, 1945	LANL worker killed building weapon
May 25, 1946	LANL worker killed building weapon
April 11, 1950	Plane with nuclear weapon crashed near Manzano Mountains
May 22, 1957	Bomb accidentally dropped on Albuquerque outskirts
December 30, 1958	LANL worker killed building weapon
September 3, 1974	Radioactive liquid escaped, spilling into street in Los Alamos
July 16, 1979	Dam holding uranium tailings failed, 1 million gallons of radioactive liquids released near Church Rock
October 1981	Plutonium leak in Los Alamos contaminated 15 people

HAZARD PROFILE – NUCLEAR / RADIOLOGICAL ACCIDENTS

Hazard Characteristics

After a nuclear incident, the main concern is the effect on the health of the population near the incident. External radiation, inhalation and ingestion of radioactive isotopes, can cause acute health effects (death, severe physical impairment), latent health effects (cancers), and psychological effects. Additional considerations include the long-term effects to the environment and agriculture.

Although radiation cannot be detected by the senses, sophisticated instruments can detect even the smallest levels of radiation.

Severity and Probability of Occurrence

State and local governments, with support from the federal government and utilities, develop emergency response plans for nuclear facilities that include a "Plume Exposure Pathway," an emergency planning zone with a radius of 10 miles from the source and an "Ingestion Exposure Pathway," an emergency planning zone within a radius of 50 miles from the source.

"Plume Exposure Pathway" refers to whole body external exposure to gamma radiation from the plume and from deposited materials and inhalation exposure from the passing radioactive plume. The duration of primary exposures could range in length from hours to days.

The "Ingestion Exposure Pathway" refers to exposure primarily from ingestion of water or foods such as milk and fresh vegetables that have been contaminated with radiation. Nuclear facilities must notify the appropriate authorities in the event of an accident. The Federally recognized classification levels are: Unusual Event, Alert, Site Area Emergency, and General Emergency.

Although the City of Santa Fe is not within a 10 mile Plume Exposure Pathway planning zone, it is within the 50-mile radius, meaning that, in the case of a large-scale general emergency, the City of Santa Fe may be affected.

Several factors affect the severity of radiation exposure:

- Time – Most radioactivity loses its strength fairly quickly. Limiting the time spent near the source of radiation reduces the amount of radiation exposure received. Following an accident, local authorities monitor any release of radiation, determine the level of protective actions, and announce when the threat has passed.
- Distance – The more distance between the target and the source of radiation, the less radiation received. In the most serious nuclear accidents, local officials will likely call for an evacuation, thereby increasing the distance between people and radiation.
- Shielding – Heavy, dense materials between the target and the source of radiation provide protection from excess radiation. In some cases, the walls of residential and commercial structures would be sufficient shielding for a short period of time.
- Availability of potassium iodide—Potassium iodide saturates the thyroid gland and protects it from the uptake of radioactive iodine.

Across the U.S., a number of events that reach the level of "Unusual Event" or "Alert" (see Table 29 for definitions) occur each year at the 100+ nuclear facilities. These events warrant the notification of local emergency managers. Of these, "Alert" level emergencies occur less frequently. For example, in 1997, there were 40 notifications of unusual events and three alert-level emergencies nationwide. However, as with other human-caused hazards, the probability of accidents or deliberate incidents is difficult to determine.

Table 29: Nuclear Event Warning Classifications

Warning Classification	Description
Notification of Unusual Event	The least serious of the four levels. The event poses no threat to you or to plant employees, but emergency officials are notified. No action by the public is necessary.
Alert	Declared when an event has occurred that could reduce the plant's level of safety, but backup plant systems still work. Emergency agencies are notified and kept informed, but no action by the public is necessary.
Site Area Emergency	Declared when an event involving major problems with the plant's safety systems has progressed to the point that a release of some radioactivity into the air or water is possible, but is not expected to exceed EPA Protective Action Guidelines (PAGs) beyond the site boundary. Thus, no action by the public is necessary.
General Emergency	The most serious of the four classifications and is declared when an event at the plant has caused a loss of safety systems. If such an event occurs, radiation could be released that would travel beyond the site boundary. State and local authorities will take action to protect the residents living near the plant. The alert and notification system will be sounded. People in the affected areas could be advised to evacuate promptly or, in some situations, to shelter in place. When the sirens are sounded, you should listen to your radio, television and tone alert radios for site-specific information and instructions.

Critical Facilities

Due to the relatively close location of LANL, all critical facilities are potentially vulnerable to nuclear/radiological accidents, especially airborne contaminants. However, risks decrease as distance increases and most critical facilities are located outside the 10-mile emergency planning zone.

Estimating Potential Loss

There are no known nuclear facilities within the City of Santa Fe. The likelihood of structural damage to residences, commercial properties, or critical facilities due to a nuclear accident is extremely low. With such a low probability of damages due to nuclear incidents, there is no information available concerning potential loss.

Future Development Trends

Projected development patterns are focused outside of the 10-mile emergency planning zone but fall within the 50-mile planning zone. The impacts of a nuclear accident are best addressed in an emergency operations plan.

CONCLUSIONS—NUCLEAR/RADIOLOGICAL ACCIDENTS

Summary of Hazard Identification, and Vulnerability Assessment

The nearby location of LANL poses potential risks to populated areas. However, the City is located outside the 10-mile emergency-planning zone.

What Can Be Mitigated?

Because of the unpredictability of human-caused hazards, mitigation should focus primarily on the possible targets/victims of human-caused hazards rather than on the hazard itself. Raising citizen awareness of what to do in the event of an emergency (for example, whether to evacuate or stay inside) and hardening critical facilities are two ways in which pre-disaster actions can limit vulnerability.

Data Limitations

Determining the probability of nuclear/radiological accidents is extremely difficult. Methods for calculating such probabilities are not accessible to communities. Due to national security concerns, it is not possible to know the quantity and nature of radiological materials being used at LANL.

OVERVIEW – SPACE WEATHER IN SANTA FE, NEW MEXICO

Space weather is the concept of changing environmental conditions in near-Earth space or the space from the Sun's atmosphere to the Earth's atmosphere. It is distinct from the concept of weather within the Earth's planetary atmosphere (troposphere and stratosphere). Space weather is the description of changes in the ambient plasma, magnetic fields, radiation and other matter in space. Much of space weather is driven by energy carried through interplanetary space by the solar wind from regions near the surface of the Sun and the Sun's atmosphere.

For centuries, people have noticed the aurora, which is caused by space weather, but did not understand it. Space weather affected the first electrical telegraphs in the 1840 in various areas at various times. The great solar storm of 1859 disrupted telegraph operations around the world, which was covered in many major newspapers at that time. A direct connection with the disruption with a solar flare observed the day before and a great deflection of the Earth's magnetic field (or geomagnetic storm) simultaneous with the telegraph disruption. With this connection, space weather, as we now know it, became a subject of academic research within the study of solar physics. With the introduction of radio for commercial and military uses, it was noted that periods of extreme static or noise occurred. Severe radar jamming during a large solar event in 1942 led to the discovery of solar radio bursts (radio waves which cover a broad frequency range created by a solar flare), another aspect of space weather.

In the 20th century, the interest in space weather has expanded as military and commercial systems have come to depend on systems affected by space weather. Communications satellites are a vital part of global commerce. Weather satellite systems provide information about terrestrial weather. The signals from satellites of the Global Positioning System are used in a wide variety of commercial products and processes. Space weather phenomena can interfere with or damage these satellites or interfere with the radio signals to and from these satellites. Space weather phenomena can cause damaging surges in long electrical transmissions lines and expose passengers and crew of aircraft travel to radiation, especially on polar routes.

The term space weather came into usage in the 1990s when it became apparent that the impact of the space environment on human systems demanded a more coordinated research and application framework (Wikipedia, 2013). Although Space weather may not be a recognized disaster event currently, the MPT wanted to be proactive in addressing the potential effects on communications.

Previous Occurrences – City of Santa Fe, New Mexico

Based on the definition of the space weather there is no doubt that the City of Santa Fe has been affected by space weather. There have been minor interruptions in radio communications and electrical power that may only have been noted by amateur radio operators or those in the communications and electrical services fields.

Frequency

At the time of the writing of this mitigation plan, frequency data was unavailable. As this plan is updated any data related to the frequency of space weather will be added to this plan accordingly.

Severity and Probability of Occurrence

A large geomagnetic storm in May of 1921 was modeled to identify its potential effect on the modern power grid. Based on the location of the 1921 event more than 350 transformers would be at risk of permanent damage and 130 million people without power if the same event occurred today. The loss of electricity would result in infrastructure disruptions that would affect all segments of the community.

"The strongest geomagnetic storm on record is the Carrington Event of August-September 1859, named after British astronomer Richard Carrington who witnessed the instigating solar flare with his unaided eye while he was projecting an image of the sun on a white screen. Geomagnetic activity triggered by the explosion electrified telegraph lines, shocking technicians and setting their telegraph papers on fire; Northern Lights spread as far south as Cuba and Hawaii; auroras over the Rocky Mountains were so bright, the glow woke campers who began preparing breakfast because they thought it was morning.

At the moment, no one knows when the next super solar storm will erupt. It could be 100 years away or just 100 days.[16]

Vulnerability Assessment – Space Weather

Critical Facilities

A large space weather event would create "... extensive social and economic disruptions," a NASA report warns. Power outages would be accompanied by radio blackouts and satellite malfunctions; telecommunications, GPS navigation, banking and finance, and transportation would all be affected. Some problems would correct themselves with the fading of the storm: radio and GPS transmissions could come back online fairly quickly. Other problems would be lasting: a burnt-out multi-ton transformer, for instance, can take weeks or months to repair. The total economic impact in the first year alone could reach $2 trillion, some 20 times greater than the costs of a Hurricane Katrina or, to use a timelier example, a few TARPs.

The weather conditions that NASA's Advanced Composition Explorer (ACE) reports won't change our plans about going to the beach. But the information it provides will help scientists understand how events on the Sun have the ability to disrupt Earth's communications, overload power grids, present a hazard to astronauts, and affect weather patterns. We call this effect on Earth "space weather." Model of ACE spacecraft

The Earth is continually bombarded with accelerated particles from the Sun and other galactic sources. ACE gives scientists the ability to study these energetic particles and further their

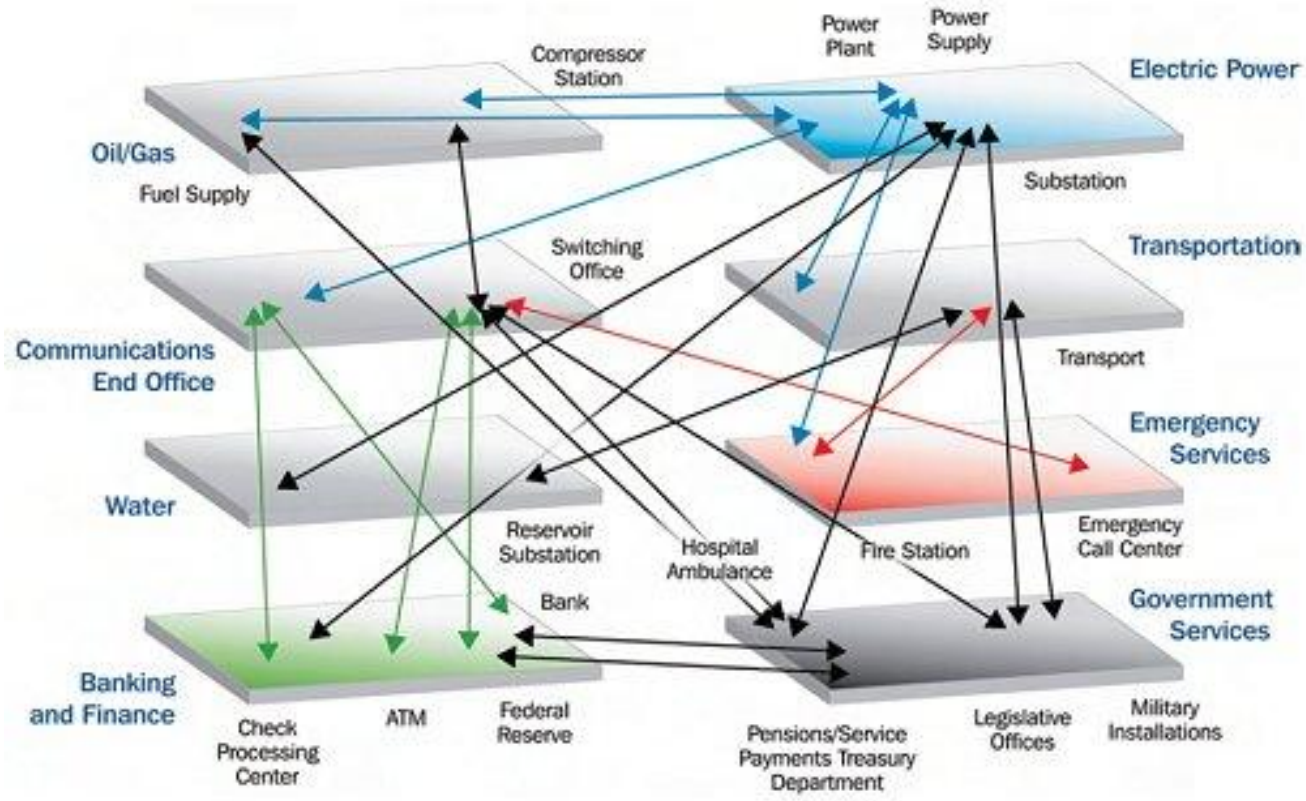
[16] Source: NASA: http://science1.nasa.gov/science-news/science-at-nasa/2009/21jan_severespaceweather/

understanding of the formation and evolution of the Solar System. The information ACE provides also helps to develop ways to protect the planet from their effects, including space weather.

So what is happening on the Sun that can cause serious effects on Earth? The Sun has an 11-year cycle of increasing and decreasing sunspots and solar storms. In one of the biggest types of storms, a Coronal Mass Ejection (CME), up to 100 million tons of solar material can be ejected from the Sun's surface at speeds greater than two million miles per hour. This amount of material is comparable to the amount of water in the Mediterranean Sea. As CMEs leave the Sun, they can accelerate particles to nearly the speed of light.

When a CME reaches Earth, it can transfer its energy to Earth's magnetic field and disable satellites. As a result, spacecraft sometimes feel the effects of major increases in "killer" electrons and other particles energized by the storms. The high-energy particles from the CME can penetrate the walls of the International Space Station and other near-Earth spacecraft and pose a health hazard for NASA's astronauts. High electric currents can also be generated in Earth's power grids, which can destroy large transformers and temporarily shut down neighboring power grids.[17] Figure 17 illustrates some of the complex inter dependencies of modern living.

Figure 17: Space Weather Affects on Infrastructure



Source: Department of Homeland Security.

[17] Source: NASA; http://www.nasa.gov/missions/solarsystem/f_ace.html

Conclusions – Space Weather

Summary of Hazard Identification and Vulnerability Assessment

Future Development Trends

Development of communities does not factor in the affects of space weather. Those industries critical to the community infrastructure and the high paced technology world we live do follow the reports and advisory provided by the professionals. Additionally, future development of communication infrastructures review and determine the best approach countering the affects of space weather.

What Can Be Mitigated?

NASA's 2009 report ends with a call for infrastructure designed to better withstand geomagnetic disturbances, improved GPS codes and frequencies, and improvements in space weather forecasting. Reliable forecasting is key. If utility and satellite operators know a storm is coming, they can take measures to reduce damage—e.g., disconnecting wires, shielding vulnerable electronics, powering down critical hardware. A few hours without power is better than a few weeks.

NASA has deployed a fleet of spacecraft to study the sun and its eruptions. The Solar and Heliospheric Observatory (SOHO), the twin STEREO probes, ACE, Wind and others are on duty 24/7. NASA physicists use data from these missions to understand the underlying physics of flares and geomagnetic storms; personnel at NOAA's Space Weather Prediction Center use the findings, in turn, to hone their forecasts. http://science1.nasa.gov/science-news/science-at-nasa/2009/21jan_severespaceweather/

Data Limitations

Determining the probability of space weather is extremely difficult. Methods for calculating such probabilities are not accessible to communities. As this is a hazard that isn't widely assessed by many communities, it is important to understand the possibility of space weather affecting the infrastructure of a community. As this plan is updated in the future, any data related to space weather will be include.

Conclusion – Hazard Identification/Risk Assessment

The hazard identification and risk assessment presented in this section were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its "How-to" guidance document titled *Understanding Your Risks: Identifying Hazards and Estimating Losses* (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, stakeholder input, and professional and experienced judgment regarding observed and/or anticipated hazard impacts. It also carefully considers the findings in other relevant plans, studies and technical reports.

This hazard analysis and risk assessment is based on the best and most up-to-date available data from local, state and federal sources. It presents a reasonable range of hazards that have affected the city and in some cases the state in the past. By extrapolation, those same hazards can be expected to affect the city in the future. Nevertheless, there are a number of conclusions that we can make from the hazard analysis and risk assessment:

- City, County and State-owned and critical facilities are no more exposed to natural hazards than are other structures in the same general vicinity. In many ways, these structures are less exposed to natural hazards than other structures due to existing understanding of commonly occurring events, such as floods, and the deliberate consideration of these hazards in the situation (locating) of these structures
- Critical facilities deserve additional mitigation attention because of the higher potential life and property loss or environmental harm in the unlikely event that they suffer significant damage
- Improving our understanding of the risk associated with the natural hazards in the City of Santa Fe through better understanding of the complexities and dynamics of risk, how levels of risk can be measured and compared, and the myriad of factors that influence risk. An understanding of these relationships is critical in making balanced and informed decisions on managing the risk
- Comparing the risk among the natural hazards addressed. The ability to quantify the risk to all these hazards relative to one another helps in a balanced, multi-hazard approach to risk management at each level of governing authority. This ranking provides a systematic framework to compare and prioritize the very disparate natural hazards that are present in the City of Santa Fe. This final step in the risk assessment provides the necessary information for local officials to craft a mitigation strategy to focus resources on only those hazards that pose the most threat to the county.

It is important to note that, although some hazards are classified as low or moderate in probability of occurrence, it does not mean that they cannot affect the City of Santa Fe in any significant way, only that such an occurrence is relatively less likely. The hazard analysis in this document provides helpful insights for planning purposes and determination of priorities, but it cannot offer guarantees.

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Section 3 – City of Santa Fe Vulnerabilities

Vulnerable Populations

Socioeconomic Vulnerability

Various socioeconomic factors contribute to the risk that some populations may bear greater impact from disasters than others. Some of these factors are personal wealth, age, gender, and race. Vulnerable subgroups of populations for Santa Fe were determined using 2010 US Census data presented in Section 1. Factors attributing to impact include:

- A population that is under 18 and over 65 years old is more likely to need additional assistance during a disaster, so large concentrations of populations in either of these subgroups could pose complications during a disaster. According to 2010 estimated U.S. Census data, there were 27,569 households (24.1%) with children under the age of 18 and 13.9% of the population of the City is over 65.
- Santa Fe's economy has been based largely on tourism and state government, as it's the capitol of New Mexico and the government is the largest employer in the area. A large disaster may keep tourists away as was the case during the nationally publicized Cerro Grande Fire in 2000. Much of the State government is located in Santa Fe and disruption of services would affect the entire state.
- As business and population growth continues in Santa Fe, the potential impacts of prolonged drought grow significantly. Continued residential housing and commercial development in Santa Fe and the surrounding areas will be difficult to sustain with the limited water resources currently available.

Infrastructure: According to the Encarta World English Dictionary, infrastructure, with regard to public services or systems, consists of the large-scale public systems, services, and facilities of a country or region that are necessary for economic activity, including power and water supplies, public transportation, telecommunications, roads, and schools. Table 32 below outlines the infrastructure identified as vulnerable to the hazards most likely to occur in the City of Santa Fe.

The most vital factor in identifying any area's infrastructure is consideration of what facilities and functions create an improvement in public health, both physically and mentally. Power and water supplies, public transportation, telecommunications, roads, and schools are all important to the community's welfare. However, other critical services include hospitals, medical centers, public safety organizations, and other government divisions that assist in the community's response and recovery during a hazardous event.

Vulnerability: Any location's or structure's vulnerability to a hazard must be evaluated for exposure to the hazard, frequency of occurrence, and damaging effects. Any area's existing hazards will expose population and structures to their effects. However, if the frequency of occurrence is low, mitigation of any particular hazard may not be necessary. Another factor in

determining whether mitigation strategies are appropriate is cost-effectiveness: if the cost of mitigation is higher than the cost of repairing potential damages, mitigation may not be worthwhile.

The City of Santa Fe identified infrastructure, locations, and hazard or risk exposure are noted in Table 32. The hazard/risk exposure notations have the following meanings: "No specific vulnerability" indicates that the structure is not located in a potential hazard area; "Potential HAZMAT area" indicates that the structure is located within 800 meters of a HAZMAT route; and "Potential flooding" indicates that the structure is located in the floodplain.

Table 30: Vulnerable Infrastructure in Santa Fe, NM

Infrastructure	Location	Hazard/Risk Exposure
Emergency Services		
Santa Fe Police Dept. Headquarters (Back-up EOC)	2515 Camino Entrada	No specific vulnerability
Santa Fe Fire Dept. Headquarters (Station 1)	200 Murales Road	No specific vulnerability
Santa Fe Community Convention Center (Primary EOC)	201 W. Marcy Ave.	No specific vulnerability
SFFD Station 3	1751 Cerrillos Rd	No specific vulnerability
SFFD Station 4	1130 Arroyo Chamiso	No specific vulnerability
SFFD Station 5	1750 Siler Rd	No specific vulnerability
SFFD Station 7	2391 Richards Ave.	No specific vulnerability
SFFD Station 8	6796 Jaguar Dr.	No specific vulnerability
SFFD Station 9 (Sub-Station)	2501 Camino Entrada	No specific vulnerability
SFFD Station 6 (Sub-Station)	Alameda/Spruce	No specific vulnerability
Station 10 (ARFF)	121 Aviation Dr.	No specific vulnerability
Government Facilities		
Santa Fe City Hall	200 Lincoln Ave	No specific vulnerability
Santa Fe Siler Road Complex	1142 Siler Road	No specific vulnerability
Santa Fe Municipal Court	2511 Camino Entrada	No specific vulnerability
Environmental Services/Parks/Streets	1142 Siler Rd.	No specific vulnerability
Water Division	801 W. San Mateo	No specific vulnerability
Facilities Div./ITT	2651 Siringo Rd	No specific vulnerability
Santa Fe Trails	2931 Rufina St.	No specific vulnerability
Montoya Federal Building	120 S. Federal Pl.	No specific vulnerability
US District Court	100 S. Federal Pl.	No specific vulnerability
First Judicial Court	100 Catron St.	No specific vulnerability
Governor's Mansion	1 Mansion Dr.	No specific vulnerability
State Capital	4901 Old Santa Fe Tr.	No specific vulnerability
State Supreme Court	237 Don Gaspar Ave.	No specific vulnerability
PERA Building	33 Plaza la Prensa	No specific vulnerability
Bataan Memorial Bldg	300 Galisteo St.	No specific vulnerability

Infrastructure	Location	Hazard/Risk Exposure
Ortiz y Pino Bldg	130 Capital St.	No specific vulnerability
Apodaca Bldg	300 Don Gaspar Ave	No specific vulnerability
Halpin Records Center	404 Montezuma	No specific vulnerability
Lamy Bldg	413 Old Santa Fe Tr.	No specific vulnerability
Villagra Bldg.	408 Gallisteo	No specific vulnerability
South Capital Complex	1190-1220 St. Francis Dr.	No specific vulnerability
Vital Records	1105 St. Francis Dr.	No specific vulnerability
West Complex	2500-2600 Cerrillos Rd.	No specific vulnerability
Surplus Property	1990 Siringo Rd.	No specific vulnerability
State Printing	2641 Siringo Rd.	No specific vulnerability
Carruthers Bldg	1209 Camino Carlos Rey	No specific vulnerability
NM DOH BHEM/EMS	1301 Siler Rd	No specific vulnerability
NM Dept. of Public Safety/State Police HQ	4491 Cerrillos Rd	No specific vulnerability
Medical Facilities		
Cristus/St. Vincents Regional Medical Center	455 St. Michaels Drive	Potential HAZMAT area
Santa Fe Indian Hospital	1700 Cerrillos Drive	Potential HAZMAT area
Physicians Medical Center	2990 Rodeo Park Drive East	Potential HAZMAT area
BMA of Santa Fe Dialysis	641 Harkle Rd	Potential HAZMAT area
Communications /Internet		
Santa Fe Information Tech and Telecom	2651 Siringo Road	Severe Weather / Space Weather
Transportation		
Municipal Airport (SAF)	121 Aviation Drive	Severe Weather

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Santa Fe Vulnerability by Hazard

Summary of Vulnerability and Losses

The City of Santa Fe is vulnerable to the effects of natural hazards profiled in this Plan. Each hazard has a unique set of characteristics that can produce different effects and impact the community differently, depending on the magnitude, duration, and intensity. Furthermore, the same hazard events will affect different parts of the city in different ways, based on geography, development, population distribution, and age of buildings. Flooding is easily mapped from previous trends; however, the other hazards (wildfires, high wind, and thunderstorms/lightning) are harder to map due to the potential to affect areas of the city differently, the inconsistency of existing data, lack of trend data, and the lack of feasibility that these hazards would affect the entire city. For example, the nature of lightning is that they strike at random and the number and severity of past events is not necessarily a predictor of future occurrences. Therefore, loss estimation is more difficult to predict for these types of hazards. Existing disaster data is limited for use in predicting potential losses. The FEMA *How-to-Guide* gives no guidance on estimating potential losses for winter storms, hailstorms, drought, or thunderstorms/lightning. Very limited guidance is given for wildfires. To complete the loss estimate worksheets, vulnerable critical facilities that the MPT identified were used to complete a potential dollar loss per hazard event based on educated assumptions.

Table 32 provides an estimate of the percent the county, and identified jurisdictions, could be impacted by a natural hazard at any one time

Table 31: Estimated Impacts from Natural Hazards

Hazard	Average Percentage Used in Calculating City-wide Loss Scenarios	Logic/Source
Wildfire	5%	Santa Fe Community Wildfire Protection Plan, May 2008
Flood	**5%**	100 Year Flood Model
Severe Weather	60%	Situational analysis based on past occurrences
Drought	100%	New Mexico Drought Task Force, New Mexico Drought Plan, Update: December 2013
Man Made Hazards	0.1%	Situational analysis based on past occurrences
Space Weather	0.1%	Data provided by the Space Weather Prediction Center and situational analysis based on past occurrences

Vulnerability – Critical Facilities

This section summarizes the total estimated losses for each natural hazard profiled in the hazard identification section that could affect the critical infrastructure of the county and each jurisdiction. More detail on how these estimates based on FEMA methodology were derived can be found in each hazard profile. It should be noted these estimates are based on worse-case scenarios and on preliminary, incomplete data. It is generally impossible to predict exactly what damage an event will incur, but nonetheless general estimates can be made to guide planning, preparedness, response and better decision making. Furthermore it can also help increase awareness of the potential effects of natural disasters. These loss estimates also do not take into account potential economic losses, which in many cases may be worse than structural and content losses.

Critical facilities are those facilities that are critical to government response and recovery activities immediately after a disaster. These facilities include but are not limited to police and fire stations, public works facilities, sewer and water facilities, health clinic, bridges and roads, and shelters. Important facilities may not be critical during or immediately after a disaster but are important to the resiliency and recovery of the county from a disaster. Examples of important facilities to the jurisdictions in the city are the Health Centers, Police Department, Fire Department, EMS and special needs facilities. Table 31 provides a consolidated listing of identified critical facilities in Santa Fe.

Table 32: City of Santa Fe Total Critical Facilities

Critical Facilities				
Government	**Emergency Services**	**Medical Facilities**	**Communications**	**Transportation**
28	11	4	1	1

Source: Hazard Mitigation Team Members from each jurisdiction

Several facilities are identified in areas that may be affected by HAZMAT incident and space weather, however, no estimates of damage were applied to these facilities due to the nature of potential events. i.e. loss of lives and very localized loss of commerce.

Wildland Fire

Wildfire probability depends on local weather conditions, outdoor activities such as camping, debris burning and construction, and the degree of public cooperation with fire prevention measures. Drought conditions and other natural hazards (tornadoes, high winds, etc.) increase the probability of wildfires by producing fuel in both urban and rural settings. Forest damage from high winds and tornadoes may also block interior access roads and fire breaks, pull down overhead power lines or damage pavement and underground utilities.

Wildfires can cause significant damage to property and threatens the lives of people who are unable to evacuate wildfire-prone areas. Many individual homes and cabins, subdivisions, resorts, recreational areas, organizational camps, businesses and industries are located within high wildfire hazard areas. Further, the increasing demand for outdoor recreation places more people in wildlands during holidays, weekends and vacation periods. Unfortunately, wildland residents and visitors are rarely educated or prepared for wildfire events that can sweep through the brush and timber and destroy property within minutes.

Wildfires can result in severe economic losses. Businesses that depend on timber, such as paper mills and lumber companies, experience losses that are often passed along to consumers through higher prices, and sometimes jobs are lost. The high cost of responding to and recovering from wildfires can deplete state resources and increase insurance rates. The economic impact of wildfires can also be felt in the tourism industry if roads and tourist attractions are closed due to health and safety concerns, such as reduced air quality by means of wildfire smoke and ash.

Potential aftermath of wildfires includes severe erosion and the silting of streambeds and reservoirs, resulting in damage to the watershed and flooding due to a loss of ground cover. As identified in the Santa Fe County CWPP, 2008, Santa Fe County and by extension the City of Santa Fe is extremely susceptible to wildfire due to the arid climate, ongoing drought, and unhealthy forests. In addition, much of the heavily forested areas in Santa Fe County are located on steep slopes, including much of the water shed areas, which aid in the spread of fires and add to the difficulty of fighting a wildfire.

The Santa Fe Watershed is an important a source of municipal water. The Santa Fe River, which is located in the Santa Fe Watershed provides water supply to two reservoirs the McClure, Nichols, and Two Mile reservoirs. The estimated total area of the watershed area is 17,520 acres of this the City of Santa Fe owns 1,124 acres. The Santa Fe Watershed provides 40% of the water supply to the City of Santa Fe (Santa Fe County CWPP, 2008).

Damage to the city of Santa Fe's drinking water supply, of which 40% is provided by the Santa Fe Watershed (Steelman and Kunkel 2003),and potential flooding into parts of Santa Fe are realistic, undesirable outcomes from such a high intensity wildfire. Resulting ecological damage, reminiscent of the 2000 Cerro Grande fire, would require decades to recover. Risk/hazard rating for the Santa Fe Watershed is **Very High** (Santa Fe County CWPP, 2008)

For the City of Santa Fe, the results of a potential wildfire and the aftermath as identified in a recent study (*The Full Cost of New Mexico Wildfires*, January 2013) include:

- Alteration of wildlife habitat
- Damage to watershed and water supply
- Damage to public recreation facilities
- Evacuation of adjacent communities
- Tourism impact
- Damage to timber resources
- Destruction of cultural and archaeological sites
- Costs of rehabilitation and restoration
- Public health impacts
- Transpiration impacts.

The Santa Fe watershed that supplies approximately 40% of the City of Santa Fe's water is located in one of the most vulnerable areas of the State. A wildfire in the watershed would threaten the water supply for the City.

Past experience has proven that wildfires can be a significant threat to the citizens, structures, infrastructure, and natural resources within Santa Fe. Although most of the vulnerability to wildfires occurs outside the City the effect of any nearby wildfire does affect the health and economic welfare of City residents. Most importantly, the City of Santa Fe water supply is within the high-risk wildfire areas. As a result, the Mitigation Planning Team has identified the wildfire hazard as the first priority in the Plan.

Flooding

The present drought conditions in Santa Fe County (City of Santa Fe) specifically add to the flooding danger in two ways. The continuation of the drought conditions results in a reduction of ground vegetation, which reduces the land's ability to slow down runoff. Additionally, as the drought continues, the ground hardens, resulting in a reduction in its ability to absorb moisture. The combination of these two factors increases the chance of potential damage caused by flash flooding throughout the county. FEMA estimates the average damage to a home with as little as (6) six inches of flooding will produce from $20,000 to $40,000 dollars in damage to the structure and contents.

Almost 40% of small businesses never reopen their doors following a disaster because just a few inches of water can cause tens of thousands of dollars in damage. From 2007 to 2011, the average commercial flood claim was over $75,000 (FEMA 2013).

Flood vulnerability is described in terms of the community assets that lie in the path of floods. There are 1,255 structures within the City of Santa Fe in an identified Flood Zone (Table 18). The flood hazard vulnerability assessment for Santa Fe County focused on the base flood elevation, though floods of both greater and lesser flood depths are possible. Vulnerability to flash floods is difficult to determine because local terrain, soil conditions, and construction play a role in how much storm water is able to run off, percolate into the soil, or cause flash flooding. The 2008 Santa Fe Hazard Mitigation Plan identified 1,321 structures in the 100 year Floodplain; however maps for City of Santa Fe were recently updated and reported 66 fewer structures within the newly mapped floodplain.

Based on 2010 Census data the median single family home in the City of Santa Fe[18] is $310,900 potential damages and loss at $20,519,400 for structures located within the floodplain.

[18] US Census Bureau http://quickfacts.census.gov/qfd/states/35/3570500.html

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Severe Weather

Severe weather is difficult to predict precisely in pattern, frequency, and degree of severity. The impact from severe weather events (thunderstorms, hail, winter storms, and extreme heat/cold) has been moderate, with localized flooding occurring from severe thunderstorms and minor damages to specific locations from lightning. The impact from winter storms and freezes can impact the city and those who live and travel to the city. Highly vulnerable populations include those in mobile home parks, recreational vehicles, and aged or dilapidated housing, but no area is safe.

Thunderstorms/Hail/Lightning – All types of severe weather occur in the City of Santa Fe. Thunderstorm frequency increases rapidly around July 1st, peaks during August, and tapers off by the end of September. Thunderstorms are usually brief, sometimes produce heavy rainfall, and often lower afternoon temperatures noticeably. Thunderstorms in the Santa Fe County and in the City of Santa Fe can produce heavy rainfall in a short period of time, resulting in flash flooding.

Hail and lightning are common during thunderstorms. As identified in Table 21, there has been previous reports of damage from lightning and instances where people have been struck and almost killed. New Mexico ranks sixth in the nation in lightning fatalities with 0.55 deaths per million people annually. As provided by the National Centers for Health Statistics (NCHS 2010) multiple-cause-of-death tapes and the Census of Fatal Occupational Injuries (CFOI 2010), New Mexico had 374 lightning related fatalities between 1995 and 2000. As published in the DHSEM Hazard Mitigation Plan (2007), New Mexico has a 100 percent probability of a lightning event every year. There is a 100 percent chance of a lightning fatality each year.

There are no standard calculations for estimating loses due to hail, or winter storms. While damages have occurred in the past due to severe weather, it is difficult to estimate future damages to personal property and the dollar amount businesses lose due to road closures during winter storms.

Santa Fe experiences the range of severe weather hazards, including hail storms, and thunderstorms. Features like lightning, heavy rain, and high winds can damage utility infrastructure, aged or dilapidated structures, and other assets in the City of Santa Fe. Critical facilities are typically vulnerable to wind damage, lightning and hail due to age of construction and possible poor condition. No specific critical facilities were identified as vulnerable to strong winds, lighten or hail; however, emergency communications capabilities, which use unreliable electric and telephone services, may be vulnerable to disruption. Most critical facilities in the City are vulnerable to the effects of severe storms, due to potential disruption of services and transportation systems as well as possible structural failure due to high winds, heightening or hail.

Winter Storms – Snowfall in the City of Santa Fe is normally 34 inches per year and storms are generally short lived. While winter storm events in this area are usually short lived and average just a few inches of snowfall, they can cause disruption and damage to the community. School and business closures, as well as disruptions in transportation systems, electric power, telecommunications, and emergency services, are common occurrences with snowfall as minimal as two inches.

Vulnerability to the effects of winter storms on buildings is dependent on the age of the building (and what building codes were in effect at the time it was built), type of construction, and condition of the structure (i.e., how well the structure has been maintained). Except for a few visual observations, data for individual structures were not available for this study, so it was difficult to determine the exact number and types of structures within Santa Fe that have heightened vulnerability to winter storm snow loading. As more development occurs in the metropolitan areas, the potential for community impacts increases.

Most critical facilities in Santa Fe are vulnerable to the effects of severe winter storms, due to potential disruption of services and transportation systems as well as possible structure failure due to heavy snow loads.

Extreme Cold – Extreme winter cold often causes poorly insulated water pipes to freeze. Even some poorly-protected indoor plumbing may rupture as frozen water expands within them, causing property damage. Fires, paradoxically, become more hazardous during extreme cold. Water mains may break and water supplies may become unreliable, making firefighting more difficult.

Snow and ice can be hazards in two respects: they reduce visibility and traction for vehicle operators, and they strain power lines, roofs, and other structures. Severe winter storms have been and will continue to be a significant threat to the economic and social well-being of City residents. Disruptions of emergency and other essential services are the main threats to the people and property. In the City of Santa Fe two recent extreme cold weather events in NM that have affected the citizens of Santa Fe. These events were exacerbated by a natural gas shortage.

Extreme Heat – Extreme Heat can equally affect Santa Fe County and the City of Santa Fe's roadways and other infrastructures, but it is generally a health risk, not a structural hazard. In temperatures exceeding 90°F, young children, the elderly, outdoor laborers, and sick people are the most likely to suffer from sunstroke, heat cramps, heat exhaustion, and possibly heatstroke. The City has maintained a very limited list of past occurrences which does not identify any extreme heat issues. Vulnerability is viewed as low based on discussions with MPT members and comments from public participants. Overall, the impact from extreme heat is minor. Vulnerable populations include elderly, transient, and low-income residents. Crops and livestock can also be vulnerable to extreme heat.

About 40 percent of the population in the City of Santa Fe is at risk from the effects of extreme heat, excluding outdoor laborers and the sick/injured, as information on their numbers was not available at the time of the study. Table 33 illustrates the population of Santa Fe who are at risk to the effect of extreme heat.

Table 33 Population of Santa Fe at Risk to Extreme Heat

Population of Santa Fe New Mexico at Risk to the Effects of Extreme Heat		
	Percentage of Santa Fe Total Population	**Population Sector**
	17.6%	Persons Over 65 Years of Age
	5.5%	Persons Under 5 Years of Age
	16.5%	Persons Living Below the Poverty Level
Total	39.6%	
Total City Population	69,204	
Total Number of Persons at Risk	27,404	

Source: http://quickfacts.census.gov/qfd/states/35/3570500.html

Note: A portion of this population may intersect with persons over 65 and persons under 5 years of age.

Several critical facilities in the City, such as municipal buildings or schools are vulnerable to the effects of extreme heat temperatures, such as potential disruption of services and public transportation systems. No specific critical facilities have been identified as particularly vulnerable to extreme heat. The impact from extreme summer heat is Low. Vulnerable populations include elderly, transient, and low-income residents. Crops and livestock can also be vulnerable to extreme heat.

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Drought

The impact of drought falls into several danger areas: fire, agricultural, and hydrological. The fire danger in New Mexico's wildland areas remains very high. Although this danger decreases with July and August thunderstorms, the overall precipitation deficit remains. In the area of agriculture, the soil is suffering from multi-year deficits, and according to the United States Department of Agriculture, 61% of New Mexico range and pasture land is in poor to very poor condition. From the hydrological standpoint, all river basins within New Mexico remain in a moderate (warning status) to severe (emergency status) drought condition, and most reservoir storage is well below normal. Although the July and August rains will continue to ease the fire danger and provide some benefit to range and pasture lands, their effect will be minimal on reservoir storage. As the city population continues to grow, demands for water will increase. With the present drought conditions causing water availability to shrink, resource conservation is needed to ensure a sustainable future. The duration of the present drought conditions in the City of Santa Fe is very difficult to predict. At present it is reported that weather patterns are similar to those that occurred in the 1950's. The "Great Drought" was considered to be a disastrous time in New Mexico. However, there are indications that the current drought may be even more severe than that. Although it is not possible to predict the long-term severity of this drought, it is safe to say that the City of Santa Fe is presently suffering from the effects of drought conditions.

As water resources are reduced or become limited, the extent of sustainable growth within the City of Santa Fe will also become limited. The continuation of drought conditions within the City is considered an issue that needs mitigation consideration. Although it is not possible to provide a mitigation plan that can eliminate the causes of drought, actions are available to reduce its effects on the community. Santa Fe received 14.2 inches of precipitation in 2012, as measured by the National Weather Service. About 14.7 inches is normal, according to the National Weather Service.

Santa Fe County (City of Santa Fe) is currently in an extreme drought situation (Figure 14). Given that drought is a slow-moving hazard without an event to mark its arrival, a one-time drought can be difficult to define. However, the consequences of a moderate to severe drought in Santa Fe County (City of Santa Fe) pose significant challenges. Long-term solutions for coping with a limited water supply will require increased cooperation between urban users and agricultural use.

A prolonged drought also increases the probability of other hazards. Forests become more susceptible to wildfires and native vegetation dies, leaving exposed soils susceptible to erosion, flash flooding, and dust storms.

The Mitigation Planning Team has identified drought as a priority hazard in the City of Santa Fe.

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Man Made Hazards to include Terrorism, Hazmat Incidents, Nuclear Facility Accidents

Hazardous Incidents

HAZMAT events in the City are generally handled by the Santa Fe Fire Department. The cost in handling a HAZMAT event is extremely dependent on the materials involved and location of the event. According to the Santa Fe Fire Department, most HAZMAT calls are small and cost between $300 and $500 per hour. Additionally, a large event, requiring the full team and backup personnel, will cost a minimum of $3,000 per hour. Along with the cost for fire personnel and equipment, additional costs will be incurred depending on the number of law enforcement and emergency medical personnel that will also be required during a given response. Further costs can be expected when a HAZMAT event occurs in an area of high population or business district.

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Space Weather

As technology advances, populations grow, and urban industrialized areas sprawl, Earth becomes more dependent upon systems that are vulnerable to damage from solar storms, including electrical grids and the swarm of satellites in orbit above Earth's protective atmosphere. Today's electrical grids are more susceptible to solar-storm disruption than their more localized predecessors because of the large geographical areas they cover and their interconnected nature. Communications systems and networks have developed beyond ground-based lines to satellite-based transmissions.

Satellite-based activities and operations are also vulnerable to the direct impact of a flux of solar energetic particles. About 150 satellites currently orbit Earth hundreds to thousands of kilometers above the top of the atmosphere for the purpose of relaying television and telephone signals at very high to ultrahigh frequencies (VHF/UHF). Both frequency ranges are used because their short wavelengths can penetrate Earth's ionosphere with minimal reflectance and interference. However, VHF and UHF wavelengths are not short enough to afford them complete immunity to atmospheric interaction, and they are susceptible to disruption from significant modulations in the ionosphere, which can occur during solar storms. One such storm occurred on July 14, 2000, when a large flare bombarded Earth with energetic particles that disrupted communications and associated support systems. Weather satellites returned pictures blurred by static, commercial fishing boats lost radio communication, and power companies in the northeastern United States had to reroute electricity in response to voltage disruptions.

Based on this vulnerability of space weather there is no doubt that the City of Santa Fe has been affected by space weather. There have been minor interruptions in radio communications and electrical power that may only have been noted by amateur radio operators or those in the communications and electrical services fields. As the Space Weather Prediction Center reports disturbances and the possibility of space weather affecting earth, the City will document changes and outages accordingly.

At the time of the writing of this mitigation plan, frequency data was unavailable or past occurrences. As this plan is updated any data related to the frequency of space weather and the affects of space weather on communications and other related results will be added to this plan accordingly.

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Capabilities and Resources

Capabilities

The City of Santa Fe has a number of resources that can be called on to help implement hazard mitigation actions. These resources are both private and public, and exist at the local, state, and federal levels. The diversity of Santa Fe's landscape, culture, and residents is reflected in the varying level of community services found in the City. The areas surrounding the City of Santa Fe benefit from the readily available public services such as police and fire protection, hospitals, and clinics. The City of Santa Fe's capabilities are summarized in Table 36.

Table 34: City of Santa Fe Resource and Capability Assessment Matrix

Jurisdiction	Comprehensive Plan	Capital Improvements Plan	Zoning	Emergency Response Plan	Subdivision Regulations	Planning Commission	Building Code[1]	Post-Disaster Recovery Ordinance	Water Conservation Ordinances	Wildfire Prevention Ordinance	Participation in NFIP & Floodplain Ordinance	Local Law Enforcement	Fire Department	Certified Flood Plan Manager
City of Santa Fe	•	•	•	•	•	•	•	•	•	•	•	•	•	•

[1]The State of New Mexico has adopted the 1997 Uniform Building Code as the minimum standard for all communities in the state.

The Mitigation Planning Team – The City of Santa Fe had a robust planning team that has been meeting regularly since 2012 and is invested in the Hazard Mitigation Planning process. The MPT includes representation of each jurisdiction.

Website – The City has a website that was used to gather information from the public and to seek input for mitigation planning. The planning team will continue to post meeting notices, meeting notes, information requests, and HMP updates as they occur.

Floodplain Ordinances – The City has floodplain ordinances and a floodplain manager to administer the ordinances. Through administration of floodplain ordinances, the city ensures that all new construction or substantial improvements to existing structures located in the100-year floodplain are built with first-floor elevations above the base flood elevation or are flood proofed.

Zoning – Building Codes – Land Use Regulations – Building codes are important mitigation tools because they can be tailored to fit specific hazards present in each region. At a minimum

the City has adopted the State of New Mexico Uniform Building Codes. Starting July 1, 2004, New Mexico's Construction Industries Division, which has oversight and provides inspection services for unincorporated areas of the state, switched from the 1997 Uniform Building Code (UBC) to the 2003 International Building Code (IBC).

The County and the City of Santa Fe have adopted several development regulations. The Uniform Building Code (UBC), implemented statewide, and the floodplain ordinance, implemented locally, are two of the most important capabilities that the County/City utilizes to prevent potential damage from floods, wind, and other hazards.

- ✓ *Uniform Building Code*—Building codes are important mitigation tools because they are tailored to fit specific hazards present in each region. Consequently, structures that are built to applicable codes are resistant to hazards such as strong winds, floods, and wildfires, and can help mitigate the effects of these hazards. New Mexico has adopted the 1997 UBC code as a minimum standard for all communities and provides inspection services through the Construction Industry Division of the New Mexico Department of Regulations and Licensing. Individual counties and municipalities are at liberty to adopt the most current UBC but have not yet chosen to do so.
- ✓ Land Use Codes (Ordinance No. 1980-6, amended 1996) include Subdivision Regulations (1973), a Terrain Management Plan, the Santa Fe Water Conservation Ordinance (2002), the Santa Fe Extraterritorial Zoning Ordinance (1997), and the Santa Fe Flood Plain Ordinance (1996).
- ✓ *Floodplain Ordinance*—Through administration of floodplain ordinances, the municipalities ensure that all new construction or substantial improvements to existing structures located in the 100-year floodplain are built with first-floor elevations above the base flood elevation.

The County also undertook several important planning initiatives prior to this hazard mitigation plan that affect the City of Santa Fe:

- ✓ Santa Fe County developed and began implementation of a comprehensive plan document in March of 1980. The Comprehensive Plans emphasizes the need for planned growth within Santa Fe County. All of these policies and strategies presented in the Plan promote sound land use and regional cooperation among local governments to address planning issues. The Comprehensive Plan was updated in 1999 and does not contradict the goals and objectives of the Plan.
- ✓ Santa Fe County has participated in the National Flood Insurance Program (NFIP) since 1995. Santa Fe County has had flood damage prevention ordinances since 1996. These ordinances were designed to minimize flood losses within the County.
- ✓ Santa Fe County has completed a capital improvement plan aimed at enhancing the economic viability of its communities.
- ✓ Santa Fe County has completed a Wildfire Assessment for the unincorporated areas of the County. This document will be used to assess threat and establish priorities for mitigation.
- ✓ Santa Fe County has taken steps to address water conservation and reduce the severity of drought for the County by implementing a Water Conservation Ordinance (No. 2002-13).

This ordinance mandates water conservation measures for residents and businesses within Santa Fe County. The Santa Fe County Water Conservation Ordinance is outlined in the Drought Hazard Identification portion of the plan.

Incorporation of Capabilities

The MPT reviewed the initiatives listed above and incorporated these existing efforts where it was applicable into the mitigation actions enumerated in Sections Two and Three of the Plan.

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RESOURCES

Additional community-based, technical and funding resources currently available for Santa Fe include the following:

Community-based Organizations

- ✓ *Firewise Communities/USA*—is a project of the National Wildfire Coordinating Group's Wildland Urban Interface Working Team. It provides information and guidance for communities in the wildland-urban interface area. (www.firewise.org).

Technical Resources—to help in future decision making:

- ✓ *FEMA elevation certificates* - are kept on file at Santa Fe County Planning and Zoning. Certificates are in paper format only but provide detailed information that can be used to determine risk on a building-by-building basis.
- ✓ *Community Development Block Grants* (CDBG) *Geographic Information System* (GIS) capabilities at the County level.

Funding Opportunities for possible support of mitigation or multiple objective actions, including:

- ✓ *Community Development Block Grants* (CDBG)—The Community Service Department administers the CDBG program for the County.
- ✓ *Debt Capacity*—Authority to incur debt through special tax, general obligation bonds, revenue bonds, and private activity bonds.
- ✓ *Capital Improvement Program*.
- ✓ *Taxes*—The City has the authority to levy sales taxes.
- ✓ *Fees*—The City has the authority to levy fees for water, sewer, gas, trash collection, landfills and electric service.
- ✓ Emergency Management Response Plan—Adopted in 2000.

SUMMARY OF CAPABILITIES AND RESOURCES

The Capabilities and Resources of Santa Fe related to mitigation planning can be summarized in term of opportunities and deficiencies to be addressed in the mitigation plan and implementation strategy as follows:

Opportunities

- ✓ Updates to the Comprehensive Plan for Santa Fe County provide opportunities to integrate information about hazard vulnerability into the process of determining development suitability and long-range strategies in the County that will lead to sustainable growth.
- ✓ Community Rating System (CRS) planning is consistent with and complementary to the mitigation planning process undertaken for the Disaster Mitigation Act of 2000 and can help in developing more detailed mitigation activities for flood related disasters in Santa Fe County.
- ✓ The City of Santa Fe has not yet developed a Wildfire Assessment for those wildland-urban interface areas located within the City limits.

Deficiencies

- ✓ Mitigation projects and planning would benefit from the participation of tribal governments.
- ✓ The City of Santa Fe has not applied to FEMA to become part of the Community Rating System (CRS). The CRS is an NFIP-established program recognizing and encouraging communities that implement floodplain management practices that exceed the minimum NFIP standards. Under the CRS, flood insurance premium rates are adjusted to reflect the reduced flood risk resulting from community actions that meet the requirements of CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote awareness of flood insurance.
- ✓ Development is still allowed in the floodplain although there are provisions to provide some measure of mitigation.

Section 4 – Goals, Objectives and Mitigation Actions

This section presents a series of goals, objectives, and mitigation actions to help guide the County in addressing its hazard vulnerabilities. The identified mitigation actions reflect the vulnerabilities discussed in Section One by identifying measures that may help the County and included municipalities avoid, prevent, or otherwise reduce damages from hazards.

Terminology

Goals are general guidelines that explain what you want to achieve. Goals are usually expressed, as broad policy statements representing desired long-term results. In this Plan, goals directly respond to the results of the hazard identification and risk assessment.

Objectives describe strategies or implementation steps to attain the identified goals. Objectives are more specific statements than goals. The described steps are usually measurable and can have a defined completion date.

Actions provide more detailed descriptions of specific work tasks to help a community achieve the goals and objectives. For each objective statement, there are alternatives for mitigation actions that must be evaluated to determine the best choices for each situation.

Mitigation Plans include a listing and description of the preferred mitigation actions and the strategy for implementation, i.e., who is responsible, how will they proceed, when should the action be initiated and/or completed.

Mitigation Goals and Objectives

The goals and objectives presented below were developed in light of the risk assessment findings presented in Section One, with direction and guidance provided by the City of Santa Fe Mitigation Planning Team and NM DHSEM.

Current criteria under DMA 2000 recommend that local mitigation plans be consistent with and support their State's hazard mitigation plan. The State of New Mexico's existing State Hazard Mitigation Plan October 2007, details the mitigation goals, objectives, and strategies based on the State's risk assessment. The State's hazard mitigation goals are presented in Figure 17. The mitigation objectives and actions identified by the Mitigation Planning Team are presented below and according to hazard type in the same order as Section One. However, this listing does not reflect the order in which the projects will be implemented. In Section Three, recommended projects are prioritized for implementation as resources become available.

The ultimate mission of hazard mitigation is the protection and preservation of life and property from the effects of the occurrence of natural hazards. Local governments can make progress toward this goal through coordinated planning and financing to achieve the specific objectives

set forth in their hazard mitigation plans. To this end, the Mitigation Planning Group's (MPT) strategy has been to develop several methods for mitigating the hazards identified in Section 2, Hazard Identification/Risk Analysis, as the most likely hazards to have severe consequences in Santa Fe: flood, drought wildfire, high wind, severe storms, extreme heat and earthquakes. The MPT has developed goals and objectives and has suggested action items that can provide directions and methods for mitigating these hazards. The Team met to discuss goals and objectives. Feedback from local officials and communities stress lack of resources and need to work within Santa Fe's stressed capabilities.

Figure 18: New Mexico Hazard Mitigation Goals

State of New Mexico Hazard Mitigation Goals
• Reduce the number of injuries due to natural hazards • Reduce the number of fatalities from natural hazards • Reduce the amount of property damage, both public and private, from natural hazards • Shorten recovery times after natural hazard events • Improve communication, collaboration and integration among state and local emergency management agencies • Increase awareness and understanding of risks and opportunities for mitigation among the citizens and elected officials of New Mexico

Mitigation Goals

The overarching goal of mitigation is to save lives, limit injuries, decrease property damage, and reduce recovery time in future responses. Mitigation can reduce the enormous cost of disasters to property owners and all levels of government. In addition, mitigation can protect critical facilities, reduce exposure to liability and minimize community disruption. Preparedness, response, and recovery measures support the concept of mitigation and may directly support identified mitigation actions by 1) *increasing awareness of hazards and their effects*; 2) *decreasing the possibility of impact from the most significant threats*; 3) *decreasing the vulnerability of critical and non-critical facilities*; 4) *increasing established response mechanisms by enhancing partnerships*; and 5) *increasing coordination between levels of government regarding incidents and response mechanisms*.

This current HMP is intended to facilitate these goals and actions and to focus on the county's top priorities for hazard mitigation for the next five years. If other hazards that currently are not deemed significant do become significant in the future, updates to this plan will include mitigation strategies to address them. Table 35 outlines the City's profiled hazards and the goals, objectives and actions the MPT identified during the meeting process.

Wildfire Mitigation Actions

Table 35: City of Santa Fe profiled Hazards, Goals, Objectives and Actions

Hazard	Goal	Objective	Actions
Wildfire	Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure due to wildfires.	Reduce the exposure to critical facilities in high or extreme wildfire hazard areas.	Identify, create and maintain defensible space around critical facilities located in high or extreme wildfire hazard areas, such as schools, fire stations, etc.
			Conduct assessment of City-owned critical facilities vulnerable to wildfire and replace roofs with fire resistant materials.
		Reduce the exposure of residential structures to wildfires	Reduce fuel loads and create defensible space around structures in the wildland - urban interface areas. • Expand Chipping Program • Expand Fuel Thinning Program
			Develop dependable sources of water for fire suppression in all residential areas of the City.
		Educate the public in defensible space and other preventative measures to minimize wildfire risk	Make educational materials available through the Land Use Department to inform citizens about Best Management Practices (BMPs) for defensible Space
			Create Firewise Communities in high risk subdivisions
			Educate the public on evacuation routes and evacuation procedures. Build upon existing evacuation routes.
			Educate the public on Wildland-Urban Interface (WUI) best practices through demonstration site and educational brochures.
			Expand delivery of “Ready, Set, Go!” program.

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Flood Mitigation Actions

Hazard	Goal	Objective	Actions
Flooding	Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure due to flooding.	Reduce exposure of structures and roads to flooding	Conduct flash flooding hydrology studies in flood prone areas of the city.
			Enhance and/or develop drainage in flood prone areas of the city.
			Protect wells from actual and potential sources of contamination during flooding.
			Continue to meet the compliance requirements outlined in the NFIP.
			Conduct studies and update floodplain and Floodway maps in the City of Santa Fe.
		Build and support local capacity to enable the public to prepare for, respond to and recover from disasters	Expand and disseminate GIS and other hazard information on the internet.
			Develop, support and fund Citizen Corps Programs, to include Community Emergency Response Teams (CERT) that also includes a mitigation component.
			Create a virtual and physical library that contains all technical studies, particularly natural resources.
			Develop and Flood Hazard Education/Outreach Plan
			Work with city officials to increase awareness among property owners including information mailings to property owners in the 100-year floodplain; and sponsoring a series of workshops about costs and benefits of acquiring and maintaining flood insurance coverage for property owners in the 100-year floodplain.

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Severe Weather Mitigation Actions

Hazard	Goal	Objective	Actions
Severe Weather	Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure due to severe weather.	Develop a comprehensive approach to reducing the possibility of damage and loss of function to identified vulnerable buildings and critical facilities, due to the effects of severe weather hazards.	Conduct non-technical evaluation process for critical facilities to determine relative severe weather vulnerability and gather information for subsequent refinements of this mitigation plan.
		Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, compliance with current building codes, etc.	Complete structure data records in the city's Geographic Information System to allow future revisions of this plan to more easily incorporate information about property values, construction types, etc.
	Reduce possibility of injury and death due to severe weather.	Increase public awareness of actions to take during all types of severe weather.	Increase number of radios/televisions with warning capabilities in public buildings, parks, and recreational areas to announce alerts from the Emergency Alert System and National Weather Radio.
			Purchase NOAA radio for public buildings
		Increase participation in and number of storm watcher programs throughout City.	Increase number of National Weather Service's SKYWARN on the ground storm spotters; recruit and train additional storm spotters. SKYWARN spotters enhance the National Weather Service's storm detection capabilities by identifying and reporting potentially dangerous weather conditions.
			Establish city as a *StormReady* City to enhance preparedness for the impacts of severe weather through better planning, education, and awareness.

Hazard	Goal	Objective	Actions
		Identify critical facilities and buildings that are vulnerable to severe weather events.	Utilize existing critical facility data records in the Santa Fe City Geographic Information System to target City-Owned structures in need of updating.
			Conduct a survey of all manufactured homes in the City to gather data on location, age, and condition to determine appropriate mitigation action (anchoring structures, relocation, and acquisition).
			Determine the number of emergency generators to power essential buildings and seek acquisition.
Severe Weather (High Wind)	Reduce possibility of severe damage, injury and death due to High Wind.	Identify critical facilities and buildings that are vulnerable to high winds.	Utilize existing critical facility data records in the city's Geographic Information System to target structures in need of updating.
			Conduct a survey of all manufactured homes in the City to gather data on location, age, and condition to determine appropriate mitigation action (anchoring structures, relocation, and acquisition).
Severe Weather (Extreme Heat)	Reduce possibility of injury and death due to Extreme Heat.	Increase public awareness of actions to take during extreme heat events.	Review existing extreme heat emergency response plans for enhancement opportunities
			Work with social support agencies, homeowners associations and general public to develop and implement monitoring and warning systems focused on vulnerable populations and provision of adequate shelter facilities during heat emergencies.

Drought Mitigation Actions

Hazard	Goal	Objective	Actions
Drought	Reduce possibility of damage and loss due to drought.	Educate the population on damage and loss due to drought	Publish and distribute educational materials on water conservation techniques and drought management strategies.
			Conduct public meetings with local and visiting subject matter experts to educate the public on how to decrease their risk to drought.
			Encourage citizens to implement water conservation measures by distributing water saving kits which include replacement shower heads, flow restrictions and educational pamphlets which describe water saving techniques. Also encourage conservation by offering rebates for ultra-low-flow toilets.
			Implement water metering and leak detection programs followed by water main repair/replacement to reduce losses.
		Continue efforts to encourage residents to use water-saving landscaping techniques.	Fund program to meter domestic wells.
			Enforce existing zoning and building regulations on water use.
			Expand City of Santa Fe water conservation incentive program.
			Implement projects to use treated effluent for non potable uses.

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Manmade Mitigation Actions

Hazard	Goal	Objective	Actions
Human Caused Hazards **(including Hazard Material Releases, Nuclear Facility Accidents and Terrorism)**	Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure due to human-caused hazards.	Develop a comprehensive approach to reducing the possibility of injury and loss of life for residents and occupants of existing structures and critical facilities with the highest relative vulnerability to the effects of hazardous material releases from discrete locations.	The Mitigation Planning Team should work with facility owners and operators identified in Section One of this plan as having the greatest potential impact (based on population in the immediate vicinity) to ensure: • Facilities are in compliance with all relevant local, state and federal requirements; • Neighboring property owners understand the potential extent of the risk; and • Alert and warning systems are appropriate to the situation. Pursue the installation of warning systems around hazardous material facilities if it is determined that existing warning systems are inadequate for the purposes of alerting neighboring property owners.
		Protect the public water system and other critical facilities from contamination from hazardous materials incidents	Assess need to and methods to harden critical facilities against the effects of human-made hazards, e.g., the accidental or intentional release of chemical, biological, or radioactive material; the accidental or intentional detonation of explosives; or acts of random violence or terrorism.
		Protect the general population and special populations from hazardous materials incidents.	Maintain and update equipment used to respond to hazardous materials incidents.
			Ensure the Emergency Operations Plan meets or exceeds current state and federal hazardous materials emergency planning requirements.

Hazard	Goal	Objective	Actions
		Improve communications with facilities housing special populations, such as nursing homes, senior centers, and daycare centers.	Provide city-wide emergency communication systems that are not dependent on local telephone and electrical services.
		Increase awareness of hazards and actions to take during an emergency.	The Mitigation Planning Team should seek opportunities to inform individuals and business owners regarding recommendations for how to prepare for hazardous material releases. The recommendations will advise taking some of the same actions to prepare for earthquakes, floods, and fires, i.e., store a multi-day supply of food and water, make sure flashlights, portable radios, and spare batteries are on hand; and identify out-of-town contacts and a place to reunite if separated from family members. All residents can be better prepared by becoming more aware of surroundings and reporting suspicious activity to local officials.

Space Weather Mitigation Actions

Hazard	Goal	Objective	Actions
Space Weather	Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure due to space weather.	Protect the communication systems and other critical facilities from space weather events.	Assess the need and ways to harden critical facilities/infrastructure against the effects of space weather events.
		Increase awareness of the impact of space weather events on the community.	Conduct Public education and awareness program.

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Public Awareness Actions

Hazard	Goal	Objective	Actions
Public Awareness	Promote disaster-resistant development.	Encourage and facilitate the development or revision of comprehensive plans and zoning ordinances to limit development in high hazard areas and improve the ability to identify vulnerable structures.	Distribute and promote the inclusion of the vulnerability analysis information as part of periodic plan review and revisions at the City level.
			Utilize a GIS for identifying "sensitive area" properties in the City.
		Encourage and facilitate the adoption of building codes that provide protection for new construction and substantial renovations from the effects of identified hazards.	Promote adoption of the Wildland-Urban Interface Code by the city.
		Provide adequate and consistent enforcement of ordinances and codes within and between jurisdictions.	Work with the State, County and municipal building inspectors to consistently enforce the building code from jurisdiction to jurisdiction.
	Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.	Provide public education to increase awareness of hazards and opportunities for mitigation.	Identify and publicize success stories as part of an overall consistent public relations program.
			Develop opportunities for community participation in emergency preparedness programs, to include citizen advisory committees and Citizen Corps Programs.
		Promote partnerships to continue the development of a citywide approach to identifying and implementing mitigation actions.	Convene regular meetings with the Mitigation Planning Team to discuss issues and progress related to the implementation of the plan.
			Promote partnerships among the city departments, non-profit organizations, and the private sector to develop a citywide approach to mitigation activities.
			Incorporate hazard mitigation concepts into all applicable city operations.

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Prioritization of Mitigation Actions

The methodology used here to determine action item priorities was based upon a consensus of the MPT. Factors considered were cost effectiveness, environmental impact, and technical feasibility. However, nothing in this plan should be construed as an absolute. Rather, the priorities identified in this plan are to be viewed as guidelines for City of Santa Fe and its partners in hazard mitigation within the county, not as requirements. City of Santa Fe needs to assess its evolving vulnerability to the hazards it faces and make its own priority determinations. This may result in continual change in the ranking of hazards.

Due to the many needs of the City of Santa Fe, the MPT decided that projects requiring extensive City investment are not realistic. Funding from other sources must be sought in order to complete many of the proposed projects. Many of the following projects stress participation of community personnel and residents of City of Santa Fe in educational programs and in existing programs. The Planning Team members discussed the costs and benefits associated with capital-intensive projects and only included those that were considered high priority.

The mitigation strategies described here, including funding for mitigation actions, are part of an overall, general plan for preventing or mitigating beforehand potentially hazardous situations. However, far less mitigation funding is available than is needed, and there is intense competition for what is available. The Department of Homeland Security and Emergency Management (DHSEM) is sometimes able to offer grant applicants technical assistance in planning and executing specific projects, but federal pre-disaster mitigation funding must be authorized annually by Congress. Post-disaster mitigation funding is based on disaster costs arising from a Stafford Act disaster declaration.

Often grant funding is for specific types of projects, and potential grant recipients must use what is available to them, regardless of priority. The Federal Emergency Management Agency (FEMA) allocates grants to local governments based upon recommendations from the state. The state in turn prioritizes grant applications based upon the needs of a given applicant in a given situation. Considering these limitations, it is not possible to predict the amount of mitigation grant funding that will be available in the future, and so funding has not been considered a limiting factor in developing mitigation strategies and action items for this plan.

Other factors, such as special considerations with respect to National Environmental Policy Act (NEPA) regulations and the National Historic Properties Act (NHPA) can impose limitations on spending federal funds, making some actions so difficult as to become all but impossible. For planning purposes, the MPT has not considered these limitations either. When the time actually comes for deciding to pursue a specific project with federal funding, all of these factors will come into play.

FEMA defines Benefit-Cost Analysis (BCA) as the method by which the future benefits of a mitigation project are determined and compared to its cost. The end result is a Benefit-Cost Ratio (BCR), which is derived from a project's total net benefits divided by its total cost. The BCR is a numerical expression of the cost-effectiveness of a project. BCRs of 1.0 or greater have more benefits than costs and are therefore cost-effective.

Fundable projects were those that the benefit-cost analysis had determined to be cost effective. For these projects, the cost of implementing the mitigation technique is less than the cost of not providing any mitigation and continuing to pay for the consequences of not mitigating.

The Team used the STAPLE + E process, which is composed of the following evaluation categories: **S**ocial, **T**echnical, **A**dministrative, **P**olitical, **L**egal, **E**conomic, and **E**nvironmental. Each category has its own specific considerations that must be met when evaluating a mitigation method (Table 37).

Table 36 STAPLE+E Process

Evaluation Category	Considerations
Social	• Community Acceptance • Adversely Affects Segment of Population
Technical	• Technical Feasibility • Long-Term Solution • Secondary Impacts
Administrative	• Staffing Levels & Training • Funding Allocated • Maintenance/Operations
Political	• Political Support • Local Champion or Proponent • Public Support
Legal	• State Authority • Existing Local Authority • Action Potentially Subject to Legal Challenge by Opponents
Economic	• Benefit of Mitigation • Cost of Mitigation Action • Contributes to Economic Goals • Outside Funding Requirements
Environmental	• Affects Land/Water Bodies • Affects Endangered Species • Affects Hazardous Materials and Waste Sites • Consistent with Community's Environmental Goals • Consistent with Federal Laws

Source: Table adapted from FEMA 386-3, Developing the Mitigation Plan: Identifying Mitigation Actions and Implementing Strategies

Each criterion in the STAPLE + E process was evaluated and rated according to: 0 = Poor, 1 = Fair, 2 = Good, 3 = Excellent. These rating were defined as:

Poor: The mitigation method does not meet basic criteria established under the evaluation category.

Fair: The mitigation method meets the basic criteria established under the evaluation category.

Good: The mitigation method exceeds the basic criteria established under the evaluation category.

Excellent: The mitigation method exceeds the basic established criteria in an innovative or new way.

The lists of projects that follow contain the list of mitigation actions, including the rationale for inclusion, responsible organizations, estimated costs, possible funding sources, and timeline for implementation. Following is the list of mitigation actions, identified by the Mitigation Planning Team, for the City of Santa Fe. The actions for each jurisdiction are listed in order of priority and the overall priority ranking, per the preceding discussion, is also indicated. Table 37 provides outlines those projects by natural hazard and priority and estimated cost. Table 38 provides an overview of responsible agencies, projected timelines and possible funding sources. A copy of the assessment form and final prioritization from is located in Appendix D.

Table 37: Prioritization of Mitigation Actions

Hazard	Actions	Estimated Cost
Wildfire	Reduce fuel loads and create defensible space around structures in the wildland - urban interface areas. • Expand Chipping Program • Expand Fuel Thinning Program	$300,000
Severe Weather	Conduct non-technical evaluation process for critical facilities to determine relative severe weather vulnerability and gather information for subsequent refinements of this mitigation plan.	$0.00
Wildfire	Identify, create and maintain defensible space around critical facilities located in high or extreme wildfire hazard areas, such as schools, fire stations, etc.	$600,000
Space Weather	Assess the need and ways to harden critical facilities/infrastructure against the effects of space weather events.	$0.00
Flooding	Protect wells from actual and potential sources of contamination during flooding.	$300,000
Wildfire	Make educational materials available through the Land Use Department to inform citizens about Best Management Practices (BMPs) for defensible Space	$30,000

Hazard	Actions	Estimated Cost
Flooding	Enhance and/or develop drainage in flood prone areas of the city.	$10,000,000
Flood	Conduct studies and update floodplain and Floodway maps in the City of Santa Fe.	$300,000
Severe Weather	Establish city as a *StormReady* City to enhance preparedness for the impacts of severe weather through better planning, education, and awareness.	$5,000
Human Caused Hazards (including Hazard Material Releases, Nuclear Facility Accidents and Terrorism)	The Mitigation Planning Team should seek opportunities to inform individuals and business owners regarding recommendations for how to prepare for hazardous material releases. The recommendations will advise taking some of the same actions to prepare for earthquakes, floods, and fires, i.e., store a multi-day supply of food and water, make sure flashlights, portable radios, and spare batteries are on hand; and identify out-of-town contacts and a place to reunite if separated from family members. All residents can be better prepared by becoming more aware of surroundings and reporting suspicious activity to local officials.	$0.00
Drought	Publish and distribute educational materials on water conservation techniques and drought management strategies.	$50,000
Human Caused Hazards (including Hazard Material Releases, Nuclear Facility Accidents and Terrorism)	Assess need to and methods to harden critical facilities against the effects of human-made hazards, e.g., the accidental or intentional release of chemical, biological, or radioactive material; the accidental or intentional detonation of explosives; or acts of random violence or terrorism.	$0.00
Space Weather	Conduct Public education and awareness program.	$5,000.00
Flood	Develop, support and fund Citizen Corps Programs, to include Community Emergency Response Teams (CERT) that also includes a mitigation component.	$125,000
Human Caused Hazards (including Hazard Material Releases, Nuclear Facility Accidents and Terrorism)	Maintain and update equipment used to respond to hazardous materials incidents.	$250,000
Wildfire	Develop dependable sources of water for fire suppression in all residential areas of the City.	$8,000,000
Wildfire	Expand delivery of “Ready, Set, Go!” program.	$125,000

Hazard	Actions	Estimated Cost
Public Awareness	Incorporate hazard mitigation concepts into all applicable city operations.	$0.00
Severe Weather	Determine the number of emergency generators to power essential buildings and seek acquisition.	$2,000,000
Severe Weather (High Wind)	Utilize existing critical facility data records in the city's Geographic Information System to target structures in need of updating.	$50,000
Human Caused Hazards (including Hazard Material Releases, Nuclear Facility Accidents and Terrorism)	Ensure the Emergency Operations Plan meets or exceeds current state and federal hazardous materials emergency planning requirements.	$0.00
Severe Weather	Increase number of radios/televisions with warning capabilities in public buildings, parks, and recreational areas to announce alerts from the Emergency Alert System and National Weather Radio.	$15,000
Human Caused Hazards (including Hazard Material Releases, Nuclear Facility Accidents and Terrorism)	Provide city-wide emergency communication systems that are not dependent on local telephone and electrical services.	$500,000
Severe Weather (Extreme Heat)	Review existing extreme heat emergency response plans for enhancement opportunities	$0.00
Human Caused Hazards (including Hazard Material Releases, Nuclear Facility Accidents and Terrorism)	The Mitigation Planning Team should work with facility owners and operators identified in Section One of this plan as having the greatest potential impact (based on population in the immediate vicinity) to ensure: • Facilities are in compliance with all relevant local, state and federal requirements; • Neighboring property owners understand the potential extent of the risk; and • Alert and warning systems are appropriate to the situation. Pursue the installation of warning systems around hazardous material facilities if it is determined that existing warning systems are inadequate for the purposes of alerting neighboring property owners.	$125,000
Public Awareness	Promote partnerships among the city departments, non-profit organizations, and the private sector to develop a citywide approach to mitigation activities.	$0.00

Hazard	Actions	Estimated Cost
Severe Weather	Complete structure data records in the city's Geographic Information System to allow future revisions of this plan to more easily incorporate information about property values, construction types, etc.	$50,000
Public Awareness	Convene regular meetings with the Mitigation Planning Team to discuss issues and progress related to the implementation of the plan.	$0.00
Flood	Develop and Flood Hazard Education/Outreach Plan	$40,000
Severe Weather (High Wind)	Conduct a survey of all manufactured homes in the City to gather data on location, age, and condition to determine appropriate mitigation action (anchoring structures, relocation, and acquisition).	$150,000
Drought	Fund program to meter domestic wells.	$200,000
Public Awareness	Work with the State, County and municipal building inspectors to consistently enforce the building code from jurisdiction to jurisdiction.	$0.00
Wildfire	Ensure compliance with the recently adopted wildland-urban interface ordinance by hiring additional staff to do on-site inspections and enforcement.	$0.00
Severe Weather (Extreme Heat)	Work with social support agencies, homeowners associations and general public to develop and implement monitoring and warning systems focused on vulnerable populations and provision of adequate shelter facilities during heat emergencies.	$0.00
Public Awareness	Distribute and promote the inclusion of the vulnerability analysis information as part of periodic plan review and revisions at the City level.	$0.00
Flooding	Conduct flash flooding hydrology studies in flood prone areas of the city.	$300,000
Drought	Implement water metering and leak detection programs followed by water main repair/replacement to reduce losses.	$50,000,000
Drought	Implement projects to use treated effluent for non potable uses.	$1,000,000
Drought	Conduct public meetings with local and visiting subject matter experts to educate the public on how to decrease their risk to drought.	$0.00

Hazard	Actions	Estimated Cost
Flood	Work with city officials to increase awareness among property owners including information mailings to property owners in the 100-year floodplain; and sponsoring a series of workshops about costs and benefits of acquiring and maintaining flood insurance coverage for property owners in the 100-year floodplain.	$50,000
Severe Weather	Utilize existing critical facility data records in the Santa Fe City Geographic Information System to target City-Owned structures in need of updating.	$50,000
Severe Weather	Purchase NOAA radio for public buildings	$5,000
Severe Weather	Increase number of National Weather Service's SKYWARN on the ground storm spotters; recruit and train additional storm spotters. SKYWARN spotters enhance the National Weather Service's storm detection capabilities by identifying and reporting potentially dangerous weather conditions.	$5,000
Drought	Encourage citizens to implement water conservation measures by distributing water saving kits which include replacement shower heads, flow restrictions and educational pamphlets which describe water saving techniques. Also encourage conservation by offering rebates for ultra-low-flow toilets.	$150,000.00
Wildfire	Educate the public on Wildland-Urban Interface (WUI) best practices through demonstration site and educational brochures.	$60,000
Wildfire	Conduct assessment of City-owned critical facilities vulnerable to wildfire and replace roofs with fire resistant materials.	$120,000
Public Awareness	Develop opportunities for community participation in emergency preparedness programs, to include citizen advisory committees and Citizen Corps Programs.	$125,000
Drought	Expand City of Santa Fe water conservation incentive program.	$200,000
Drought	Enforce existing zoning and building regulations on water use.	$0.00
Wildfire	Educate the public on evacuation routes and evacuation procedures. Build upon existing evacuation routes.	$0.00

Hazard	Actions	Estimated Cost
Severe Weather	Conduct a survey of all manufactured homes in the City to gather data on location, age, and condition to determine appropriate mitigation action (anchoring structures, relocation, and acquisition).	$150,000
Wildfire	Create Firewise Communities in high risk subdivisions	$60,000
Flood	Create a virtual and physical library that contains all technical studies, particularly natural resources.	$150,000
Flood	Continue to meet the compliance requirements outlined in the NFIP.	$0.00
Public Awareness	Identify and publicize success stories as part of an overall consistent public relations program.	$10,000.00
Public Awareness	Utilize a GIS for identifying “sensitive area” properties in the City.	$0.00
Flood	Expand and disseminate GIS and other hazard information on the internet.	$30,000

Santa Fe Prioritized Projects, Costs, and Funding Sources

Table 38: Project Estimated Costs, Timeline, Funding Sources and Responsible Agency

Hazard Mitigation Goals, Objectives & Actions						
Project Data		Estimated Project Cost	Estimated Completion	Agency or Dept. Responsible	Action Priority	Possible Funding Sources
Hazard	**Actions**					
Wildfire	Identify, create and maintain defensible space around critical facilities located in high or extreme wildfire hazard areas, such as schools, fire stations, etc.	$600,000	18 Months	FD	3	• Self-funded • Federal and State grant programs
	Conduct assessment of City-owned critical facilities vulnerable to wildfire and replace roofs with fire resistant materials.	$120,000	18 Months	FD	46	• Self-funded • Federal and State grant programs
	Ensure compliance with the recently adopted wildland-urban interface ordinance by hiring additional staff to do on-site inspections and enforcement.	$0.00	Ongoing	FD	33	• Self-funded
	Reduce fuel loads and create defensible space around structures in the wildland - urban interface areas. • Expand Chipping Program • Expand Fuel Thinning Program	$300,000	24 Months	FD	1	• Self-funded • Federal and State grant programs
	Develop dependable sources of water for fire suppression in all residential areas of the City.	$8,000,000	96 Months	Water Div	16	• Self-funded • Federal and State grant programs
	Make educational materials available through the Land Use Department to inform citizens about Best Management Practices (BMPs) for defensible Space	$30,000	Ongoing	FD Land Use	6	• Self-funded • Federal and State grant programs
	Create Firewise Communities in high risk subdivisions	$60,000	24 Months	FD	52	• Self-funded • Federal and State grant programs
	Educate the public on evacuation routes and evacuation procedures. Build upon existing evacuation routes.	$0.00	18 months	FD OEM	50	• Self-funded • Federal and State grant programs

Hazard Mitigation Goals, Objectives & Actions						
Project Data		Estimated Project Cost	Estimated Completion	Agency or Dept. Responsible	Action Priority	Possible Funding Sources
Hazard	Actions					
	Educate the public on Wildland-Urban Interface (WUI) best practices through demonstration site and educational brochures.	$60,000	18 months	FD	45	• Self-funded • Federal and State grant programs
	Expand delivery of "Ready, Set, Go!" program.	$125,000	18 Months	FD	17	• Self-funded • Federal and State grant programs
Flooding	Conduct flash flooding hydrology studies in flood prone areas of the city.	$300,000	18 Months	Land Use	36	• Self-funded • Federal and State grant programs
	Enhance and/or develop drainage in flood prone areas of the city.	$10,000,000	60 Months	Public Works	7	• Self-funded • Federal and State grant programs
	Protect wells from actual and potential sources of contamination during flooding.	$300,000	18 Months	Public Utilities	5	• Self-funded • Federal and State grant programs
	Continue to meet the compliance requirements outlined in the NFIP.	$0.00	On-going	Land Use	54	• Self-funded • Federal and State grant programs
	Conduct studies and update floodplain and Floodway maps in the City of Santa Fe.	$300,000	Land Use	Land Use	8	• Self-funded • Federal and State grant programs
	Expand and disseminate GIS and other hazard information on the internet.	$30,000	12 Months	GIS	57	• Self Funded
	Develop, support and fund Citizen Corps Programs, to include Community Emergency Response Teams (CERT) that also includes a mitigation component.	$125,000	18 Months	OEM	14	• Self-funded • Federal and State grant programs • Private sector donations
	Create a virtual and physical library that contains all technical studies, particularly natural resources.	$150,000	18 Months	Land Use	53	• Self Funded
	Develop and Flood Hazard Education/Outreach Plan	$40,000	12 Months	Land Use OEM	29	• Mitigation grants • Self Funded

Hazard Mitigation Goals, Objectives & Actions						
Project Data		Estimated Project Cost	Estimated Completion	Agency or Dept. Responsible	Action Priority	Possible Funding Sources
Hazard	**Actions**					
	Work with city officials to increase awareness among property owners including information mailings to property owners in the 100-year floodplain; and sponsoring a series of workshops about costs and benefits of acquiring and maintaining flood insurance coverage for property owners in the 100-year floodplain.	$50,000	12 Months	Land Use	40	• Mitigation grants • Self Funded
Severe Weather	Conduct non-technical evaluation process for critical facilities to determine relative severe weather vulnerability and gather information for subsequent refinements of this mitigation plan.	$0.00	12 Months	Land Use OEM	2	• Self-funded • Federal and State grant programs
	Complete structure data records in the city's Geographic Information System to allow future revisions of this plan to more easily incorporate information about property values, construction types, etc.	$50,000	12 Months	GIS	27	• Self-funded
	Increase number of radios/televisions with warning capabilities in public buildings, parks, and recreational areas to announce alerts from the Emergency Alert System and National Weather Radio.	$15,000	12 Months	OEM	22	• Self-funded • Federal and State grant programs • Private sector donations
	Purchase NOAA radio for public buildings	$5,000	6 Months	OEM	42	• Self-funded • Federal and State grant programs • Private sector donations
	Increase number of National Weather Service's SKYWARN on the ground storm spotters; recruit and train additional storm spotters. SKYWARN spotters enhance the National Weather Service's storm detection capabilities by identifying and reporting potentially dangerous weather conditions.	$5,000	24 Months	OEM	43	• Self-funded • Federal and State grant programs • Private sector donations.
	Establish city as a *StormReady* City to enhance preparedness for the impacts of severe weather through better planning, education, and awareness.	$5,000	12 Months	OEM	9	• Self-funded • Federal and State grant programs • Private sector donations.

Hazard Mitigation Goals, Objectives & Actions						
Project Data		Estimated Project Cost	Estimated Completion	Agency or Dept. Responsible	Action Priority	Possible Funding Sources
Hazard	Actions					
	Utilize existing critical facility data records in the Santa Fe City Geographic Information System to target City-Owned structures in need of updating.	$50,000	12 Months	GIS Land Use	41	• Self-funded
	Conduct a survey of all manufactured homes in the City to gather data on location, age, and condition to determine appropriate mitigation action (anchoring structures, relocation, and acquisition).	$150,000	24 Months	Land Use	30	• Self-funded • Federal and State grant programs
	Determine the number of emergency generators to power essential buildings and seek acquisition.	$2,000,000	36 Months	Facilities OEM	19	• Self-funded • Federal and State grant programs
Severe Weather (High Wind)	Utilize existing critical facility data records in the city's Geographic Information System to target structures in need of updating.	$50,000	12 Months	GIS Land Use	20	• Self-funded
	Conduct a survey of all manufactured homes in the City to gather data on location, age, and condition to determine appropriate mitigation action (anchoring structures, relocation, and acquisition).	$150,000	24 Months	Land Use	51	• Self-funded • Federal and State grant programs
Severe Weather (Extreme Heat)	Review existing extreme heat emergency response plans for enhancement opportunities	$0.00	12 Months	OEM	24	• Self-funded
	Work with social support agencies, homeowners associations and general public to develop and implement monitoring and warning systems focused on vulnerable populations and provision of adequate shelter facilities during heat emergencies.	$0.00	12 Months	OEM	34	• Self-funded • Federal and State grant programs
Drought	Publish and distribute educational materials on water conservation techniques and drought management strategies.	$50,000	Ongoing	Water Div	11	• Self-funded • Federal and State grant programs • Private sector donations

Hazard Mitigation Goals, Objectives & Actions						
Project Data		Estimated Project Cost	Estimated Completion	Agency or Dept. Responsible	Action Priority	Possible Funding Sources
Hazard	Actions					
	Conduct public meetings with local and visiting subject matter experts to educate the public on how to decrease their risk to drought.	$0.00	12 Months	Water Div OEM	39	• Self-funded • Federal and State grant programs • Private sector donations
	Encourage citizens to implement water conservation measures by distributing water saving kits which include replacement shower heads, flow restrictions and educational pamphlets which describe water saving techniques. Also encourage conservation by offering rebates for ultra-low-flow toilets.	$150,000.00	60 Months	Water Div	44	• Self-funded • Federal and State grant programs • Private sector donations
	Implement water metering and leak detection programs followed by water main repair/replacement to reduce losses.	$50,000,000	120 Months	Water Div	37	• Self-funded • Federal and State grant programs
	Fund program to meter domestic wells.	$200,000	24 Months	Water Div	31	• Self-funded
	Enforce existing zoning and building regulations on water use.	$0.00	Ongoing	Water Div Land Use	49	• Self-funded • Federal and State grant programs
	Expand City of Santa Fe water conservation incentive program.	$200,000	Ongoing	Water Div	48	• Self-funded • Federal and State grant programs
	Implement projects to use treated effluent for non potable uses.	$1,000,000	24 Months	Water Div	38	• Self-funded

Hazard Mitigation Goals, Objectives & Actions						
Project Data		Estimated Project Cost	Estimated Completion	Agency or Dept. Responsible	Action Priority	Possible Funding Sources
Hazard	**Actions**					
Human Caused Hazards (including Hazard Material Releases, Nuclear Facility Accidents and Terrorism)	The Mitigation Planning Team should work with facility owners and operators identified in Section One of this plan as having the greatest potential impact (based on population in the immediate vicinity) to ensure: • Facilities are in compliance with all relevant local, state and federal requirements; • Neighboring property owners understand the potential extent of the risk; and • Alert and warning systems are appropriate to the situation. Pursue the installation of warning systems around hazardous material facilities if it is determined that existing warning systems are inadequate for the purposes of alerting neighboring property owners.	$125,000	18 Months	OEM	25	• Self-funded • Federal and State grant programs • Private sector donations.
	Assess need to and methods to harden critical facilities against the effects of human-made hazards, e.g., the accidental or intentional release of chemical, biological, or radioactive material; the accidental or intentional detonation of explosives; or acts of random violence or terrorism.	$0.00	24 Months	OEM	12	• Self-funded • Federal and State grant programs
	Maintain and update equipment used to respond to hazardous materials incidents.	$250,000	18 Months	FD PD	15	• Self-funded
	Ensure the Emergency Operations Plan meets or exceeds current state and federal hazardous materials emergency planning requirements.	$0.00	12 Months	OEM FD	21	• Self-funded • Federal and State grant programs • Private sector donations.
	Provide city-wide emergency communication systems that are not dependent on local telephone and electrical services.	$500,000	18 Months	OEM PD RECC	23	• Self-funded • Federal and State grant programs

Hazard Mitigation Goals, Objectives & Actions						
Project Data		Estimated Project Cost	Estimated Completion	Agency or Dept. Responsible	Action Priority	Possible Funding Sources
Hazard	**Actions**					
	The Mitigation Planning Team should seek opportunities to inform individuals and business owners regarding recommendations for how to prepare for hazardous material releases. The recommendations will advise taking some of the same actions to prepare for earthquakes, floods, and fires, i.e., store a multi-day supply of food and water, make sure flashlights, portable radios, and spare batteries are on hand; and identify out-of-town contacts and a place to reunite if separated from family members. All residents can be better prepared by becoming more aware of surroundings and reporting suspicious activity to local officials.	$0.00	12 Months	OEM	10	• Self-funded • Federal and State grant programs • Private sector donations.
Space Weather	Assess the need and ways to harden critical facilities/infrastructure against the effects of space weather events.	$0.00	24 Months	OEM RECC ARES	4	• Self-funded • Federal and State grant programs
	Conduct Public education and awareness program.	$5,000.00	12 Months	OEM ARES	13	• Self-funded • Federal and State grant programs
Public Awareness	Distribute and promote the inclusion of the vulnerability analysis information as part of periodic plan review and revisions at the City level.	$0.00	12 Months	OEM	35	Self-funded
	Utilize a GIS for identifying “sensitive area” properties in the City.	$0.00	Ongoing	GIS	56	• Self-funded
	Work with the State, County and municipal building inspectors to consistently enforce the building code from jurisdiction to jurisdiction.	$0.00	Ongoing	Land Use	32	• Self-funded
	Identify and publicize success stories as part of an overall consistent public relations program.	$10,000.00	18 Months	OEM	55	• Self-funded

Hazard Mitigation Goals, Objectives & Actions						
Project Data		Estimated Project Cost	Estimated Completion	Agency or Dept. Responsible	Action Priority	Possible Funding Sources
Hazard	Actions					
	Develop opportunities for community participation in emergency preparedness programs, to include citizen advisory committees and Citizen Corps Programs.	$125,000	18 Months	OEM	47	• Self-funded • Federal and State grant programs • Private sector donations.
	Convene regular meetings with the Mitigation Planning Team to discuss issues and progress related to the implementation of the plan.	$0.00	12 Months	OEM	28	• Self-funded • Federal and State grant programs
	Promote partnerships among the city departments, non-profit organizations, and the private sector to develop a citywide approach to mitigation activities.	$0.00	18 Months	OEM	26	• Self-funded • Federal and State grant programs • Private sector donations.
	Incorporate hazard mitigation concepts into all applicable city operations.	$0.00	12 Months	OEM	18	• Self-funded

Section 5 – Mitigation Plan and Implementation Strategy

Monitoring, Evaluating and Updating the Plan

The Disaster Mitigation Act of 2000 (DMA2K) signed into law on October 30, 2000, amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act by adding a new section, 322 – Mitigation Planning. Section 322 places emphasis on local mitigation planning. It requires local governments to develop and submit mitigation plans as a condition of receiving Hazard Mitigation Grant Program (HMGP) project grants. An Interim Final Rule for implementing Section 322 ((44 Code of Federal Regulations (CFR) Parts 201 and 206) was published in the Federal Register (FR), Volume 67, Number 38, pages 8844 – 8854, on February 26, 2002. The requirements for local plans, or Local Mitigation Plan Criteria, are found in part 201.6.

Planning Process

As noted earlier, the MPT followed FEMA's hazard mitigation planning process as prescribed in the How-To-Guides. This planning process ensured public involvement and the participation of interested agencies and private organizations. Documentation of the planning process is addressed in this section.

Monitoring, evaluating, and updating the Plan are critical to maintaining its relevance. Effective implementation of mitigation activities paves the way for continued momentum in the planning process and gives direction for the future. This section explains who will be responsible for monitoring, evaluating, and updating the Plan, and what those responsibilities entail. This section also lays out the method and schedule of these activities and describes how the public will be involved on a continuing basis.

Historically, the task of creating the City of Santa Fe Hazard Mitigation Plan began with the establishment of a working group by Andrew Phelps, City of Santa Fe Emergency Manager. Mr. Phelps sent out invitations to those agencies, both internal and external to the City, which provides support and services (i.e., National Weather Service, City, State and Federal agencies and organizations).

After identification of the hazards and the risks they pose to the community, action plans were formulated in order to reduce or eliminate each hazardous situation. These plans were developed as a result of the working group, public input, and research conducted from sources including state drought planners, the National Weather Service, the U.S. Army Corps of Engineers, FIRM floodplain maps, and the University of New Mexico.

Once hazards were identified, an effort was made to determine the risk each hazard posed to county residents, and its historic frequency of occurrence. This process was accomplished by a historical review of local newspapers, county documents, public input, New Mexico state

government records, and university sources. Additionally, the hazard risk was planned from the aspect of the worst-case scenario for both the present population and the planned increase in population five years later. This information is located in Part II, Risk Identification and Analysis.

These action plans were prioritized based on risk factors and frequency of occurrence. Once the plan strategies and priority were established by the working group, they were presented to the City Council and members of the public by posting at the public libraries and city website for review and comment. The strategies and action plans established to mitigate hazards within the City is discussed in Part IV, Implementation Strategies.

The public was given the opportunity to be involved in the planning process and their input was incorporated in the plan in the following manner:

- An online questionnaire was introduced to the public through the website and postings in the paper. The questionnaire was also mentioned during radio interviews several times during the year. The results of the questionnaire were used to provide guidance to the MPT to identify hazards of concern to the community. (see Appendix B)
- A public meeting to provide an opportunity for input in the Plan was held on September 12, 2013 at the City's Convention Center for public comment. A meeting notice was posted on the City of Santa Fe's Office of Emergency Management's website (See Appendix A).

In New Mexico neighboring county/city emergency managers provide support, expertise, and resources to each other. The MPT provided copies of the draft HMP to neighboring emergency managers via email for their review. Additionally The City of Santa Fe will provide a copy of the final HMP to these neighboring emergency managers.

Existing Planning Mechanisms

Prerequisites

The Local Mitigation Plan Criteria state that the plan must satisfy three prerequisites before the plan will be reviewed by the state and FEMA. If these prerequisites have not been fulfilled, the plan will not be reviewed. The three prerequisites are:

- Adoption by the local governing body
- For multi-jurisdictional plans, each jurisdiction must adopt the plan
- For multi-jurisdictional plans, each jurisdiction must participate in the planning process.

The City of Santa Fe's plan is a single jurisdiction plan and will require adoption by the Santa Fe City Council. Once approved the resolution showing adoption of this plan will appear in the introductory elements (before the Table of Contents) of this HMP. After adoption, copies of the Plan will be given to the respective zoning and planning departments. During updates and revisions of community planning documents, the Plan will be presented to the planning committee for consideration.

Implementation of the HMP Plan in the Jurisdictions

Once the HMP has been approved the resolution will be incorporated into the HMP and provided to the state and FEMA. Once approved the City of Santa Fe will begin the process of incorporating the strategies and actions outlined in the Plan into future planning projects. Where applicable, all mitigation actions will be incorporated into existing' planning documents via zoning, subdivision regulations and capital improvements program and other regulatory mechanisms. The City of Santa Fe's MPT is responsible for monitoring strategies, actions and any updates to this HMP. Every six months mitigation meetings will be conducted to review the status of each jurisdictions progress. The City of Santa Fe emergency manager will monitor the plan progress and coordinate meetings.

Hazard Mitigation Planning Team

A permanent entity needs to be responsible for maintaining the Plan and for monitoring, evaluating, and updating it. This Plan recommends creating a permanent planning group, the MPT, with representation from City departments and local agencies. The City of Santa Fe Office of Emergency Management (OEM) will be the entity in charge of monitoring the plan. The City of Santa Fe OEM, the Executive Manager, will post notices on the City website and other appropriate sites to announce the meetings. The City of Santa Fe OEM represents citizen, municipal, business, educational, volunteer, and county interests in supporting mitigation strategies and actions for this plan.

The MPT will oversee the progress made on the implementation of the identified action items and update the plan, as needed, to reflect changing conditions. The MPT will therefore serve as the focal point for coordinating countywide mitigation efforts. The MPT will establish quarterly meetings and will focus on the Plan as events within the community apply to the evaluation, updating, and monitoring of hazards within the Plan. The MPT will focus specifically on the evaluation, updating, and monitoring the plan once per year. The MPT will monitor the mitigation activities by reviewing reports from the agencies identified for implementation of the different mitigation actions. The MPT will request that the responsible agency or organization submit a semi-annual report, which provides adequate information to assess the status of mitigation actions. The MPT will provide their feedback to the individual agencies.

Evaluation of the Plan should include not only checking on whether or not mitigation actions are implemented, but also assessing their degree of effectiveness. The MPT will review the qualitative and quantitative benefits (or avoided losses) of the mitigation activities and compare them to the goals and objectives that the Plan sets out to achieve. The Team will also evaluate mitigation actions to see if they need to be modified or discontinued in light of new developments. The Team will document progress annually.

The Plan will be updated every five years, as required by the DMA 2000, or following a disaster.

New data will be added from the existing and new technical resources, as well as from local planning entities and the Mitigation Team, to assess population, housing trends, the potential effects of natural and human caused hazards on people and structures, and to ensure necessary inclusion into local and county planning mechanisms. The updated Plan will account for any new developments in the City or special circumstances (e.g., post-disaster). Issues that come up during monitoring and evaluation, which require changes in mitigation strategies and actions, will be incorporated in the Plan and planning processes at this stage. The City of Santa Fe OEM will be responsible to soliciting information to update specific information, and this office will be responsible for updating citywide information and incorporating it into the revised Plan.

Public Involvment

The City of Santa Fe is dedicated to involving the public directly in reshaping and updating the Plan. Although the MPT represents the public to some extent during its review of the plan, the public will be able to comment directly on and provide feedback about the plan during the review period. A public meeting will be held after each MPT meeting. This meeting will provide a forum wherein the public can express concerns, opinions, or ideas about the plan. The City of Santa Fe OEM will publicize and host the meeting. The City of Santa Fe Emergency Manager will be responsible for keeping track of public comments about the plan.

The MPT will involve the public during the evaluation and update of the Plan through annual public education activities, public workshops, and public hearings. The MPT will also keep the public informed through newsletters, mailings, and the different agencies implementing the plan. The City of Santa Fe is encouraged develop a website dedicated to the City of Santa Fe Mitigation Plan. The MPT will incorporate the public comments in the next update of the Plan.

Updating the Plan

Monitoring, Evaluating, and Updating the Plan

Monitoring, evaluating, and updating the Plan are critical to maintaining its relevance to ensure that the HMP remains an active and relevant document. Effective implementation of mitigation activities paves the way for continued momentum in the planning process and gives direction for the future. The City of Santa Fe has developed a method to ensure that regular review and update of the Plan occurs, a method that encompasses decision making, direction, and documentation: Local officials will determine which projects / action items will be implemented and how and when they will be completed. Review and revision of the Plan will be directed by the City of Santa Fe Office of Emergency Management, and the MPT will be responsible for monitoring, evaluating, and documenting the plan's progress throughout the year. Although the members of the MPT may change from year to year, future MPTs will continue to execute the same job functions as the current MPT.

The City of Santa Fe Emergency Manager is responsible for contacting MPT members and organizing meetings and will monitor progress on the mitigation action items. Monitoring is important for future eligibility for any mitigation funding that may be available. FEMA and the NMDHSEM have the authority to evaluate the progress of existing mitigation plans to determine if the plan is fulfilling program requirements. The plan will be reviewed, revised, and updated every five years from the date of FEMA's approval. If a disaster occurs or as action items are met, the plan will be reviewed, revised, and updated sooner than the required five years.

The MPT will reconvene approximately one year before the five-year period is up and begin evaluating the plan. HMP review and update will comprise a review of each goal and action item to determine the relevance to changing situations in the county and/or changes to state or federal policy and to ensure that current and expected conditions are being addressed. Key topics and questions that will be addressed include the following:

- Identification of hazards: Are there new hazards that affect the community?
- Development of hazard profiles: Are additional maps or new hazard studies available? Have chances of future events changed? Have recent and future development in the community been assessed for their effect on hazard areas?
- Inventory of assets. Have inventories of existing structures in hazard areas been updated? Are there any new special high-risk populations? Is future land development accounted for in the inventories?
- Estimation of losses. Have losses been updated to account for recent changes?

If the response to any of the above questions is "yes," then the Plan will be updated accordingly.

The HMP will be evaluated annually and will be updated at least every two years. A revised copy of the plan will be completed by October of each year and submitted for public comment. Each jurisdiction will approve the updated plan each December. More frequent updates may be submitted for approval as needed to address new or unexpected mitigation goals and objectives or funding opportunities. A revised HMP reflecting changes in development, progress in mitigation efforts and changes in priorities will be submitted in accordance with DMA2K for approval within five years in order to continue eligibility for FEMA assistance. Table 39 provides a projected meeting schedule for maintaining the HMP.

Table 39: Projected Meeting Schedule to Maintain the HMP

HMP Meeting	Date
Initial meeting following plan approval	One month after approval
HMP Project Review	Six months after initial planning meeting
HMP Plan Review	Six months following Project Review
HMP Project Review	Six months following plan review
HMP Plan Review	Six months following project review
HMP Project Review	Six months following plan review
HMP Plan Review	Six months following project review
HMP Project Review	Six months following plan review
HMP Plan Review / Start Process to renew Grant for plan update with State and FEMA	Six months following project review

The MPT also will review the risk assessment portion of the Plan and determine if this information should be updated or modified. Revisions to this plan may also be required for different situations, e.g., the identification of specific new mitigation action items, the completion of listed mitigation action items, or a change in mitigation plan requirements for funding programs. If no changes are necessary, the MPT will provide a written justification for this determination.

The City of Santa Fe Emergency Manager is responsible for incorporating all changes into the HMP electronically after the MPT has met and decided on the changes. The City of Santa Fe Emergency Manager will complete all necessary revisions at least three months prior to the end of the five-year period to allow the MPT time to review the update. During the revision process, the City of Santa Fe Emergency Manager will send status reports to each jurisdiction for review and comment. Any required revisions will be implemented within six months following the review process. This process will be repeated for each five-year review of the plan. An updated/revised plan will be submitted to the NM DHSEM and FEMA.

Appendix A – Agendas, Meeting Minutes and Invite Letter

March 26, 2013 Hazard Mitigation Plan Update Meeting

(Agenda and Minutes available on the Mitigation Website or through the Santa Fe OEM)

City of Santa Fe, New Mexico
Hazard Mitigation Plan

Meeting Agenda

March 26, 2013
10:00 a.m. – 12:00 p.m.

Location: Coronado Room Community Convention Center
201 W. Marcy Ave. Santa Fe, NM

Type of Meeting: Hazard Mitigation Plan Meeting

Meeting Facilitators:
Brian Fields, VP & COO B-Sting Ventures, LLC
Lora Sedore, EM Specialist, B-Sting Ventures, LLC

10:00 a.m. – 10:05 a.m. Introductions

10:05 a.m. – 11:45 a.m. Hazard Mitigation Plan Update Discussion

- Updates from February 26 2013 HMP Meeting
- Discuss Goals and Objectives
- Discuss Critical Facilities Identified
- Conduct Mitigation Projects Prioritization
  - STAPLEE Process
  - Review / Prioritize Mitigation Strategies and Actions

11:45 a.m. – 12:00 a.m. Closing Remarks / Next Meeting

12:00 p.m. Adjournment

City of Santa Fe Natural Hazard Mitigation Plan Update
Mitigation Planning Team Minutes

Date/ Location
March 26, 2013
10:00 a.m. – 12:30 p.m.
Coronado Room Community Convention Center
201 W. Marcy Ave. Santa Fe, NM

Welcome
Mr. Fields opened the meeting with a brief overview of the agenda and the purpose of the meeting in moving forward to update the City's Hazard Mitigation Plan.

Introductions
Everyone in attendance provided a brief introduction of who they are and the agency they represent. A copy of the sign in sheet is located at the end of this document.

Planning Team Discussion
The agenda introduced for the meeting included the following topics:

- Updates from February 26, 2013 HMP Meeting
- Discuss Goals and Objectives and Mitigation Actions
- Discuss Critical Facilities Identified
- Conduct Mitigation Projects Prioritization
  - STAPLEE Process
  - Review / Prioritize Mitigation Strategies and Actions

Mr. Fields presented a PowerPoint briefing discussing each agenda topic outlined above. The following items were discussed during the meeting:

Other Discussion Items

- The 2010 Census Data will most likely be used for date collection, GIS is conducting some reviews to see if they have more up to date data for insertion in the plan
- There have been a few areas annexed into the City – Las Soleras – and some "donut holes"
- The City also has plans to annex other areas in the near future. We need to schedule a meeting with Land Planning Department and obtain any information that may be required for insertion in the plan
- The criteria for the critical facilities will be included in the mitigation plan text explaining the method of identification for the City of Santa Fe
- It was identified that the inter-dependency of internet services should be addressed in respect to infrastructure

City of Santa Fe Natural Hazard Mitigation Plan Update
Mitigation Planning Team Minutes

- Projects
  - Drought: Holistic range management in the watershed should be added
  - All Hazards: Back up MCU for RECC (city dispatch); no other physical location within the city - possible cost $750,000
  - Human-caused Hazards: Divide communications project into two projects
    - Response-communication
    - Alert: vulnerable populations; identify large populations of vulnerable populations for example large retirement community and provide secondary alert system such as one-way radios to receive alerts
  - Space weather projects were confirmed by the HMT
- Climate change can be addressed within individual hazards
- Andrew Phelps, City of Santa Fe Emergency Management, discussed the schools inclusion in the plan and explained the School District would have to do the same intense planning along with the City to be included in the City plan.
- Question on whether the updated (2012) FIRMs for the flood plains in Santa Fe have been adopted and included in the GIS departments' database. It was confirmed these are current as of the 12/4/12 adoption.
- Public meeting is scheduled for May 8 but the time will be changed from 5:00 to 5:30.

Task List:
The following tasks were identified from the MPT meeting:

B-Sting Ventures, LLC (BSV) (Brian Fields and Lora Sedore):
- Update Hazard Mitigation Projects list table and email updated table to Andrew Phelps for distribution – add a column for responsible party - Andrew will fill in
- Meet with Planning Department to discuss future development as well as annexation and development since the last plan was completed
- Provide template for public meeting notice to Andrew Phelps for submission to the local paper

City of Santa Fe Emergency Manager (Andrew Phelps):
- Distribute updated Hazard Mitigation Projects list to Planning Team members and receive comments NLT April 8, 2013 and provide input to BSV.
- Distribute project list to all HMP members and STAPLEE score sheet and have scored and returned to BSV NLT April 19, 2013
- Advertise Public Meeting in local paper

City of Santa Fe Flood Plain Manage:
- Contact GIS to discuss new FIRMs

City of Santa Fe Natural Hazard Mitigation Plan Update
Mitigation Planning Team Minutes

Schedule next meeting

The following meetings have been scheduled. More information will be provided prior to the meetings:

May 1, 2013 – Draft Plan Provided to City of Santa Fe Emergency Management
May 8, 2013 – Hazard Mitigation Plan Public Meeting (5:30 pm – 7pm)
June 1, 2013 – Draft Plan Provided State Hazard Mitigation Officer
June 15, 2013 – Draft Plan Submitted to FEMA for Review and Approval

The Kickoff Meeting adjourned at 12:30 pm. Additional questions or comments can be directed to the following:

Andrew Phelps – Emergency Manager
City of Santa Fe, NM
aphelps@santafenm.gov
505-629-3958 cell
505-955-6537 office

Brian W. Fields – Project Director
B-Sting Ventures (BSV) LLC
703-863-8857 mobile
bwfabq@gmail.com

Lora Sedore – Project Support
B-Sting Ventures (BSV) LLC
505-263-7013
Abqlis1@aol.com

City of Santa Fe Natural Hazard Mitigation Plan Update
Mitigation Planning Team Minutes

Mitigation Planning Team Sign In Sheet

City of Santa Fe
Office of Emergency Management
Hazard Mitigation Planning Meeting Sign-In Sheet

Date of Mitigation Planning Team Meeting: March 26, 2013 10:00 am – 12:00 pm

Please write legibility when filling in your information

Name	Title	Agency/Department	Phone	Email	Signature
Brian Fields	Contractor	BSV	[illegible]	[illegible]@gmail.com	[illegible]
Lori [illegible]	Contractor	BSV	505-263-[illegible]	[illegible]	[illegible]
Andrew Phelps	Emergency Mgr	SF OEM	505-955-[illegible]	[illegible]	[illegible]
RB [illegible]	Fp mgr COSF	COSF	955-6641	[redacted]	[illegible]
Jonathon Phillips	City of Santa Fe Water Division	COSF	955-4229	jgphillips@santafenm.gov	[illegible]
Gabe Romero	Dir S:S School	SFPS	467-3440	gromero@sfps.info	[illegible]
Katherine Mortimer	Sustainable Santa Fe Programs Mgr.	PSD/ESD	955-6262	kemortimer@santafenm.gov	[illegible]
Don Hinsman	SFARES EC	SFARES	505 467 8067	dlhinsman@comcast.net	[illegible]
Ken Martinez	RECC Director	(911) SFE RECC	505-992-3096	kmartinez@santafecounty.org	[illegible]

March 12, 2013 Hazard Mitigation Plan Update Meeting with City GIS
(Agenda and Minutes available on the Mitigation Website or through the Santa Fe OEM)

City of Santa Fe
Office of Emergency Management
Hazard Mitigation Planning Meeting Sign-In Sheet
March 12, 2013 9:10am

Andrew Phelps	Emergency Administrator	City of SF		955-5532	aphelps@ci.santafe.nm.gov	
Jim Gallegos	GIS Manager	City of SF		955-6604	jdgallegos@santafenm.gov	
Lora Sedillo	BSting			7/8/2013		
Brian Fields	B-Sting Ventures			505-863-8857	bfields@bstingventures.com	

February 26, 2013 Hazard Mitigation Plan Update Meeting

(Agenda and Minutes available on the Mitigation Website or through the Santa Fe OEM)

City of Santa Fe, New Mexico
Hazard Mitigation Plan

Meeting Agenda

February 26, 2013
10:00 a.m. – 12:00 p.m.

Location: Nambe Room Community Convention Center
201 W. Marcy Ave. Santa Fe, NM

Type of Meeting: Hazard Mitigation Plan Meeting

Meeting Facilitators:
Brian Fields, VP & COO B-Sting Ventures, LLC
Lora Sedore, EM Specialist, B-Sting Ventures, LLC

10:00 a.m. – 10:05 a.m. Introductions

10:05 a.m. – 11:45 a.m. Hazard Mitigation Plan Update Discussion

- Updates from January 2013 HMP Meeting
- Review Identified Hazards and Finalize for HMP
- Overview of HMP Outline / Hazard Assessment Example
- Discuss Past Hazard Events for Each Identified Hazard
- Discuss / Finalize City of Santa Fe Critical Facilities (Inventory Assets)
- Discuss Mitigation Projects and Prioritization Scheduled for Next Meeting

11:45 a.m. – 12:00 a.m. Closing Remarks / Next Meeting

12:00 p.m. Adjournment

Date/ Location
February 26, 2013
10:00 a.m. – 12:30 p.m.
Nambe Room Community Convention Center
201 W. Marcy Ave. Santa Fe, NM

Welcome
Mr. Fields opened the meeting with a brief overview of the agenda and the purpose of the meeting in moving forward to update the City's Hazard Mitigation Plan.

Introductions
Everyone in attendance provided a brief introduction of who they are and the agency they represent. A copy of the sign in sheet is located at the end of this document.

Planning Team Discussion
The agenda introduced for the meeting included the following topics:

- Updates from January 2013 HMP Meeting
- Review Identified Hazards and Finalize for HMP
- Overview of HMP Outline / Hazard Assessment Example
- Discuss Past Hazard Events for Each Identified Hazard
- Discuss / Finalize City of Santa Fe Critical Facilities (Inventory Assets)
- Discuss Mitigation Projects and Prioritization Scheduled for Next Meeting

Mr. Fields presented a PowerPoint briefing discussing each agenda topic outlined above. The following items were discussed during the meeting:

Overview of HMP Outline / Hazard Assessment Example
Mr. Fields provided a copy of the updated plan outline to Mr. Phelps. He has not yet reviewed it. The group agreed the proposed plan outline was appropriate and workable.

Review Identified Hazards and Finalize for HMP
Mr. Fields provided an overview of the hazard analysis conducted at the last meetings as well as assessments posted on the City of Santa Fe Emergency Management website and sent to city employees and residents. Currently 38 assessments have been received. The group reviewed the results of the assessments received. The group used the assessments provided as well as their experience and knowledge to identify the following hazards that will be profiled in the plan:

- Wildland fire
- Flooding

- Severe weather to include extreme cold and heat
- Drought
- Man Made hazards to include terrorism, hazmat incidents, nuclear facility accidents
- Space weather as it impacts communications

Past Significant Natural Hazard Events
The group brainstormed for information on historical events

- Man made
  - EPA website- TRI
  - NM DOT
  - City Fire Department
  - Studies/plans for WIPP shipments
  - Studies for 599 by-pass
- Wildfire
  - Community Wildfire Protection Plan (CWPP)
- Space Weather
  - Military
  - National Oceanic and Atmospheric Administration (NOAA)
- Severe Weather
  - NOAA
- Flooding
  - Flood Plan Manager files
  - National Flood Insurance Program (NFIP)
- Impact to community
  - Tourism drop after Cerro Grande
- Planning team members will ask others for input

Inventory Assets
Mr. Fields identified to the Mitigation Planning Team the need to continue the quest to identify those vulnerable/critical facilities in the city so we can begin determining in fracture vulnerabilities. The current hazard mitigation plan does not identify critical/vulnerable resources or structures in the city.

- Mr. Phelps provided a preliminary list of critical facilities that are sorted by owner type and function.

- A tentative meeting is planned with the GIS Department for March 12, 2013. Mr. Phelps is working to set up the official date and time with the GIS Department. B-Sting will provide them with the required data points.

Mitigation Actions
Mr. Fields discussed the requirement for Mitigation Actions. Mr. Fields stated it is time MPT to start thinking of actions (projects) now that the hazards have been identified. From the discussion the following were identified:

- The plan will include three mitigation actions per hazard (2 is the minimum as required by FEMA) identified and prioritized with one of the project potentially being public education.
- Mr. Fields encouraged those departments to start reviewing their in house planning documents and determine if there are projects that can be included in the mitigation plan. Documents referenced in the mitigation plan need to be identified accordingly
- Mr. Phelps identified two proposed projects (Notice of Intent has been sent to FEMA)
  - A wildfire fuels reduction- includes a Bosque component that will also address drought and flooding (removal of Salt Cedar and Russian Olive trees)
  - A culvert project at Cerrillos and Cerro Gordo

Task List:
The following tasks were identified from the MPT meeting:

B-Sting Ventures, LLC (BSV) (Brian Fields and Lora Sedore)

- Continue to work on the draft plan
- Develop hazard sections based on the hazards identified by the team.

City of Santa Fe Emergency Manager (Andrew Phelps)

- Set up meeting with the City GIS Department (tentative March 12, 2013 for the morning if possible)
- Provide information on critical facilities (work sheet provided)
- Complete online survey and include additional request for other significant event information
- Provide mitigation information to employees on the EM weekly briefing
- Capture web pages for documentation for the mitigation process
- Research city regulations for wildfire building restrictions
- Research recent past hazmat events, (i.e., spill on 285, gas explosion at St Francis and Cerrillos)

City of Santa Fe Natural Hazard Mitigation Plan Update
Mitigation Planning Team Minutes

Schedule next meeting

The following meetings have been scheduled. More information will be provided prior to the meetings:

March 26, 2013 – Mitigation Planning Team Prioritize Projects
May 1, 2013 – Draft Plan Provided to City of Santa Fe Emergency Management
May 8, 2013 – Hazard Mitigation Plan Public Meeting (5pm – 7pm)
June 1, 2013 – Draft Plan Provided State Hazard Mitigation Officer
June 15, 2013 – Draft Plan Submitted to FEMA for Review and Approval

The Kickoff Meeting adjourned at 12:30 pm. Additional questions or comments can be directed to the following:

Andrew Phelps – Emergency Manager
City of Santa Fe, NM
ajphelps@santafenm.gov
505-629-3958 cell
505-955-6537 office

Brian W. Fields – Project Director
B-Sting Ventures (BSV) LLC
703-863-8857 mobile
bwfabq@gmail.com

Lora Sedore – Project Support
B-Sting Ventures (BSV) LLC
505-263-7013
Abqlis1@aol.com

City of Santa Fe Natural Hazard Mitigation Plan Update
Mitigation Planning Team Minutes

Mitigation Planning Team Sign In Sheet

City of Santa Fe
Office of Emergency Management
Hazard Mitigation Planning Meeting Sign-In Sheet

Date of Mitigation Planning Team Meeting: February 26, 2013 10:00 am – 12:00 pm

Please write legibility when filling in your information

Name	Title	Agency/Department	Phone	Email	Signature
Lora Sedore	Facilitator	B Sting	505 263 7013	[illegible]	[illegible]
Brian Fields	Facilitator	B Sting	703 863 8857	BWFABQ@gmail.com	[illegible]
John Schaefer	Deputy Chief	SFPD	[illegible]	[illegible]	[illegible]
[illegible]	Emergency Prep	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Consultant	Self	505-603-3370	[illegible]	[illegible]
Don Hinkman	SFARES EC	SFARES	[illegible]	[illegible]	[illegible]
Andrew Phelps	SF OEM	SF OEM	505 629 3958	ajphelps@santafenm.gov	[illegible]
RB Zaxus	City Engineer	City SF	[illegible]	[illegible]	[illegible]
* Ken Martinez	Director	RECC	992-3076	[illegible]	[illegible]

January 23, 2013 Hazard Mitigation Plan Update Meeting

(Agenda and Minutes available on the Mitigation Website or through the Santa Fe OEM)

City of Santa Fe, New Mexico
Hazard Mitigation Plan

Meeting Agenda

January 23, 2013
10:00 a.m. – 12:00 p.m.

Location: Nambe Room Community Convention Center
201 W. Marcy Ave. Santa Fe, NM

Type of Meeting: Hazard Mitigation Plan Meeting

Meeting Facilitators:
Brian Fields, VP & COO B-Sting Ventures, LLC
Lora Sedore, EM Specialist, B-Sting Ventures, LLC

10:00 a.m. – 10:05 a.m. Introductions

10:05 a.m. – 11:45 a.m. Hazard Mitigation Plan Update Overview by Brian Fields

- Review Current Identified Hazards for Update Plan
- Discuss Past Hazard Events for Each Identified Hazard
- Discuss City of Santa Fe Critical Facilities (Inventory Assets)
- Discuss Mitigation Action Items and Priority Process
- Discuss Plan Review Process

11:45 a.m. – 12:00 a.m. Closing Remarks / Next Meeting

12:00 p.m. Adjournment

City of Santa Fe Natural Hazard Mitigation Plan Update
Mitigation Planning Team Minutes

Date/ Location
January 23, 2013
10:00 a.m. – 12:00 p.m.
Nambe Room Community Convention Center
201 W. Marcy Ave. Santa Fe, NM

Welcome
Mr. Fields opened the meeting with a brief overview of the agenda and the purpose of the meeting in moving forward to update the City's Hazard Mitigation Plan.

Introductions
Everyone in attendance provided a brief introduction of who they are and the agency they represent. A copy of the sign in sheet is located at the end of this document.

Planning Team Discussion
The agenda introduced for the meeting included the following topics:

- Review Current Identified Hazards for Update Plan
- Discuss Past Hazard Events for Each Identified Hazard
- Discuss City of Santa Fe Critical Facilities (Inventory Assets)
- Discuss Mitigation Action Items and Priority Process
- Discuss Plan Review Process

Mr. Fields presented a PowerPoint briefing discussing each agenda topic outlined above.

The following items were discussed during the meeting:

Hazards
Mr. Fields provided an overview of the hazard analysis conducted at the last meeting. To date there have only been 10 assessments received. Mr. Fields stressed the importance of obtaining more assessments. Mr. Phelps (City of Santa Fe Emergency Manager) will be emailing out to the city departments and placing on the website to give the public the opportunity to provide their input on hazards. From the discussion the following were identified:

- The planning team agreed that extreme cold should also be addressed with extreme weather
- Solar activity will be addressed although FEMA will probably not recognize it
- Tornados will be addressed within the high winds section
- Hazards for profiling will be finalized at the next meeting scheduled for February 26, 2012

City of Santa Fe Natural Hazard Mitigation Plan Update
Mitigation Planning Team Minutes

Past Significant Natural Hazard Events

- Mr. Fields provided an overview of those past events that have occurred in and around the City of Santa Fe starting from January 8, 2008 through December 31, 2012
- Mr. Fields questioned those in attendance of any other events that may have occurred that is not identified in the National Climatic Data Center. Mr. Phelps stated he will provide a comment section on the city's website to and ask this type of question.
- Planning team members will ask others for input

Inventory Assets
Mr. Fields identified to the Mitigation Planning Team the need to begin identifying those vulnerable/critical facilities in the city so we can begin determining in fracture vulnerabilities. The current hazard mitigation plan does not identify critical/vulnerable resources or structures in the city. From the discussion the following were identified:

- Critical assets are those that are essential to the health and wellbeing of the community i.e. emergency response agencies, infrastructure (water, waste water, power, gas, communications , hospitals, transportation, etc
- Vulnerable facilities are those that would be the most vulnerable during a disaster- hospitals, facilities for the elderly and infirm, schools, the watershed, etc
- Mr. Fields provided worksheets and instruction on how they will be used to determine vulnerabilities and risks. Mr. Fields requested the process of identifying these assets start now.
- One idea brought up was a meeting with the GIS department and provide them with the required data points. From this, we can begin the collection process. Mr. Phelps will identify a few dates to the contractor and set up the meetings

Mitigation Actions
Mr. Fields discussed the requirement for Mitigation Actions. This discussion has already begun with the Emergency Manager. Mr. Fields requested that part of the update, FEMA will want to see progress on previous mitigation actions. We need to determine what has been accomplished, what has not been accomplished but still required and those that are no long required due to change or other issues affecting. Mr. Fields presented to the group the list of previous mitigation actions identified in the 2008 HMP that Mr. Phelps reviewed and commented on. Though this task is later in the planning process, Mr. Fields stated it is good for the MPT to start thinking of actions (projects) and be prepared for when we begin looking at projects. From the discussion the following were identified:

- FEMA is very supportive of a community being in the NFIP
- There must be two mitigation actions per hazard identified and prioritized
- Mr. Fields encouraged those departments to start reviewing their in house planning documents and determine if there are projects that can be included in the mitigation plan. Documents referenced in the mitigation plan need to be identified accordingly

City of Santa Fe Natural Hazard Mitigation Plan Update
Mitigation Planning Team Minutes

Task List:
The following tasks were identified from the MPT meeting:

B-Sting Ventures, LLC (BSV) (Brian Fields and Lora Sedore)

- Look into adobe construction and tornados
- Research solar flares for inclusion in the Hazard Mitigation Plan
- Provide information to Andrew for public meeting notifications in the newspaper
- Continue to work on the draft plan
- Obtain a copy of the Santa Fe Drought plan – research drought emergency declaration
- Discuss hazard profiling in plan – can we discuss state hazards and not fully outline them in the plan – dismiss during the planning process with the State Hazard Mitigation Officer (Wendy Blackwell)

City of Santa Fe Emergency Manager (Andrew Phelps)

- Set up meeting with the City GIS Department
- Send information on solar storms to BSV (Mr. Fields and Ms. Sedore)
- Provide information on critical facilities (work sheet provided)
- Complete online survey and include additional request for other significant event information
- Provide mitigation information to employees on the EM weekly briefing
- Capture web pages for documentation for the mitigation process
- Research city regulations for wildfire building restrictions

Schedule next meeting

The following meetings have been scheduled. More information will be provided prior to the meetings:

February 26, 2013 – Hazard Mitigation Planning Team Meeting
March 26, 2013 – Hazard Mitigation Planning Team Meeting
May 1, 2013 – Draft Plan Provided to City of Santa Fe Emergency Management
May 8, 2013 – Hazard Mitigation Plan Public Meeting (5pm – 7pm)
June 1, 2013 – Draft Plan Provided State Hazard Mitigation Officer
June 15, 2013 – Draft Plan Submitted to FEMA for Review and Approval

City of Santa Fe Natural Hazard Mitigation Plan Update
Mitigation Planning Team Minutes

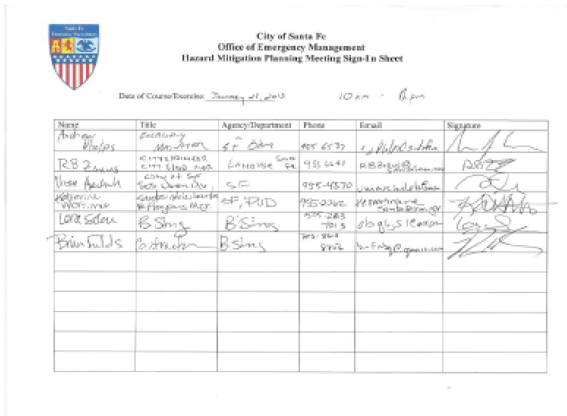
The Kickoff Meeting adjured at 12:00 pm. Additional questions or comments can be directed to the following:

Andrew Phelps – Emergency Manager
City of Santa Fe, NM
ajphelps@santafenm.gov
505-629-3958 cell
505-955-6537 office

Brian W. Fields – Project Director
B-Sting Ventures (BSV) LLC
703-863-8857 mobile
bwfabq@gmail.com

Lora Sedore – Project Support
B-Sting Ventures (BSV) LLC
505-263-7013
Abqlis1@aol.com

Mitigation Planning Team Sign In Sheet


City of Santa Fe
Office of Emergency Management
Hazard Mitigation Planning Meeting Sign-In Sheet

Date of Course/Exercise: January [illegible], 2013 10 am - [illegible] pm

Name	Title	Agency/Department	Phone	Email	Signature
Andrew Phelps	Emergency Manager	SF OEM	955 6537	[illegible]	[signature]
RB Zaxus	City Engineer City Floodplain Mgr	Land Use Santa Fe	955 6647	[illegible]	[signature]
[illegible]	City of SF [illegible]	SF	955-4370	[illegible]	[signature]
[illegible]	[illegible]	SF, PUD	955 2262	[illegible]	[signature]
Lora Sedore	B Sting	B Sting	505 263 7013	[illegible]	[signature]
Brian Fields	B [illegible]	B Sting	703 863 8857	[illegible]	[signature]

December 10th, 2012, Planning Team Kickoff Meeting

(Agenda and Minutes available on the Mitigation Website or through the Santa Fe OEM)

City of Santa Fe, New Mexico
Hazard Mitigation Plan

Meeting Agenda

December 10, 2012
9:00 a.m. – 12:00 p.m.

Location: Lamy Room Community Convention Center
201 W. Marcy Ave. Santa Fe, NM

Type of Meeting: Hazard Mitigation Plan Kickoff Meeting

Meeting Facilitators:
Brian Fields, VP & COO B-Sting Ventures, LLC
Lora Sedore, EM Specialist, B-Sting Ventures, LLC

9:00 a.m. – 9:05 a.m. Introductions

9:05 a.m. – 11:00 a.m. Hazard Mitigation Plan Update Overview by Brian Fields

- Introduction of Hazard Mitigation Plan Update
- Discuss Conducting a Natural Hazard Assessment
- Natural Hazard Mitigation Planning Process
- What Has Been Accomplished To Date
- Discuss City Website

11:00 a.m. – 11:45 a.m. Open Forum for Comments and Questions

11:45 a.m. – 12:00 p.m. Closing Remarks / Next Meetings

12:00 p.m. Adjournment

City of Santa Fe Natural Hazard Mitigation Plan Update
Planning Team Kickoff Meeting (All Stakeholders)
Minutes

Date/ Location
December 10, 2012
10:00 a.m. – 12:00 p.m.
Lamy Room Community Convention Center
201 W. Marcy Ave. Santa Fe, NM

Welcome
Mr. Phelps, City of Santa Fe Emergency Manager, opened the meeting with a brief overview of what the project is and introduced the contractor, B-Sting Ventures, LLC, who has been secured update the City's current Hazard Mitigation Plan (HMP). He stated that the contractor's role will be to facilitate updating the plan and planning team members will be asked to provide date/information for the plan.

Introductions
Everyone in attendance provided a brief introduction of who they are and the agency they represent. A copy of the sign in sheet is located at the end of this document.

Planning Team Discussion
The agenda introduced for the meeting included the following topics:

- Introduction of Hazard Mitigation Plan Update
- Discuss Conducting a Natural Hazard Assessment
- Natural Hazard Mitigation Planning Process
- What Has Been Accomplished To Date
- Discuss City Website

Mr. Fields presented a PowerPoint briefing on the Hazard Mitigation Process to the group on the numerous agenda topics related to the plan update and the processes for the future. As agenda topics were identified the following discussions that took place:

- A Mitigation Plan is the path to other funding for the City of Santa Fe. Its completion is a requirement of some FEMA funding and is required for some public assistance funding from FEMA.
- The contractor will use the forms that FEMA provides to gather data.
- Discussion on integrating climate change? We are going to look at a way to integrate the climate change effort. Mr. Fields believes this is easy to accomplish. The State Hazard Mitigation Officer (SHMO) commented that she has not seen in other plans and no comment from FEMA Region 6. Further discussions with Climate Change Team, the Emergency Manager and Contractor will occur in the upcoming months to discuss this being include in the HMP.

City of Santa Fe Natural Hazard Mitigation Plan Update
Planning Team Kickoff Meeting (All Stakeholders)
Minutes

- Mr. Fields provided an overview of what documents have been reviewed to date and how they can be included in the HMP update.
- Mr. Phelps, City Emergency Manager, inquired on including the issue (hazard) of space weather events, specifically the affects of solar flares? It's unknown at this time how we can include. The SHMO stated that she has not seen in other plans nor has FEMA region 6 made any comments on including. She will inquire with FEMA to ask the question. Mr. Hinsman, SF ARES, stated that there are ways to mitigate the affects of solar flares and that it can be considered a natural hazard. More discussion and review will occur over the next few months.
- Discussion on including such things as man-made impacts was brought up. We will assess those hazards and collect data. The SHMO will check with FEMA Region 6 with regards to including this data in the plan since the title of the plan is for Natural Hazards only. Regardless the data is important for Emergency Management in assessing all hazards the City of Santa Fe may be subject to.
- Mr. Fields introduced the hazard assessment requirement and provided all attendees with an assessment form to fill out. Each hazard was assessed based on the following: Probability/Frequency, Magnitude/Severity and Risk. An assessment chart was provided to guide the group in assessing (prioritizing) each hazard. One member of the group suggested that when assessing Probability/Frequency that the definition for high was unrealistic. It was suggested the definition "Occurs once every year or up to once every five years" be changed to read "Occurs at least once every year". Group agreed and the change will be made. For those who could not attend the meeting, a copy of the assessment will be emailed to them with instructions on how to complete. Mr. Fields will also provide the Emergency Manager with a brief overview on what each hazard is for clarification. The Emergency Manager will provide copies to the contractor so they can complete the final assessment of hazard prioritization for the updated HMP.
- What type of funding can we receive after we update the HMP? The mitigation plan may be a conduit to other monies available from FEMA and/or the information gathered can be used to request other funding- i.e.; purpose/needs statement for money from the City Council/state/other federal sources. The SHMO provide additional feedback on how the HMP will open doors for future funding.
- How will the project be managed? The Emergency Manager is the project director for the HMP update. The contractor will lead efforts to gather data for the update and follow the highly suggested FEMA process for updating HMPs. As we go through the process we must include the public in the planning process. This will be a coordinated effort in planning with the contractor and City Emergency Manager. The contractor, with assistance from the Emergency Manager, will gather the information from identified stakeholders and integrate it into the HMP.
- The Mitigation Planning Team (MPT) requesting a list of events that have occurred since the last Mitigation Plan was completed.

City of Santa Fe Natural Hazard Mitigation Plan Update
Planning Team Kickoff Meeting (All Stakeholders)
Minutes

- The MPT will be tasked with developing ways to monitor the new Mitigation Plan
- Public involvement is a requirement of the plan and at least two meetings will be scheduled.
- Mr. Phelps stated a core planning team will be formed in order to not over task the larger MPT – the core team will meet more frequently and will provide updated information to the larger group via email and the Santa Fe Emergency Manager website.
- Mr. Phelps requested volunteers for the core planning team to contact him.
- The larger group will be asked to review portions of the draft Mitigation Plan according to their subject matter strength.

HMP Update process

- Proposed schedule: Mr. Fields provided a schedule overview and the process towards updating the plan. This will be flexible as to meet the schedules of city staff requirements.
- Input we will be looking for over the next few months include:
  - Goals; review, comment and ranking
  - Hazard Identification; review, comment and ranking
  - Risk Analysis; review, comment and ranking
  - Capability; review, comment and ranking
  - Mitigation Actions; review, comment and ranking

The following items require action/response

- There were several questions concerning the definitions of land subsidence and expansive soils (definitions of these terms will be provided to the planning team)
- The MPT will review existing plans/documents that may be incorporated into the Plan.
- The MPT will work closely with Climate Review Team to ensure the Sustainable Santa Fe planning and the Mitigation planning are coordinated.
- A Core Planning team will be created and a meeting planned for late January
- A draft of the Plan will be provided to the Mitigation Planning Team in May 2013
- The MPT was reminded to make sure all planning participants understand the difference between mitigation and emergency response.
- The MPT will provide information to the Santa Fe School District and help them to define their role in the Mitigation Plan.

City of Santa Fe Natural Hazard Mitigation Plan Update
Planning Team Kickoff Meeting (All Stakeholders)
Minutes

Schedule next meeting

The following meetings have been tentatively scheduled. More information will be provided prior to the meetings.

January 23, 2013 – Hazard Mitigation Team Stakeholder Meeting
February 13, 2013 – Hazard Mitigation Team Stakeholder Meeting
March 20, 2013 – HMP Meeting (Public Meeting Possible)
May 1, 2013 – Draft Plan Provided to City of Santa Fe Emergency Management
June 1, 2013 – Draft Plan Provided State Hazard Mitigation Officer
June 15, 2013 – Draft Plan Submitted to FEMA for Review and Approval

The Kickoff Meeting adjured at 12:00 pm. Additional questions or comments can be directed to the following:

Andrew Phelps – Emergency Manager
City of Santa Fe, NM
aphelps@santafenm.gov
505-629-3958 cell
505-955-6537 office

Brian W. Fields – Project Director
B-Sting Ventures (BSV) LLC
703-863-8857 mobile
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Lora Sedore – Project Support
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505-263-7013
Abqlis1@aol.com

City of Santa Fe Natural Hazard Mitigation Plan Update
Planning Team Kickoff Meeting (All Stakeholders)
Minutes
Kickoff Meeting Sign In Sheet

City of Santa Fe Office of Emergency Management Invite Letter to Agencies and Organizations Requesting Their Participation in the Mitigation Plan Update

City of Santa Fe, New Mexico
200 Lincoln Avenue, P.O. Box 909, Santa Fe, N.M. 87504-0909

David Coss, *Mayor*

Councilors:
Rebecca Wurzburger, Mayor Pro Tem, Dist. 2
Patti J. Bushee, Dist. 1
Chris Calvert, Dist. 1
Peter N. Ives, Dist. 2
Carmichael A. Dominguez, Dist. 3
Christopher M. Rivera, Dist. 3
Bill Dimas, Dist. 4
Ronald S. Trujillo, Dist. 4

November 30, 2012

Greetings,

You are cordially invited to attend the City of Santa Fe Hazard Mitigation Plan Update Kick-Off meeting on Monday, December 10th from 9:00am to 12:00pm. Several City staff met on November 28th to begin charting the path forward for this initiative, discuss some of the benefits of having a current, FEMA-approved plan, and to discuss the type of input, information, and expertise that will be required to complete this plan revision. This meeting will build on that discussion and will include a larger group of stakeholders and subject matter experts. Please let me know if you have any questions about this meeting, the plan revision, and you or your department or division's role in this project. A Hazard Mitigation page will be posted to the Emergency Management section of the City's website by COB 11/30.

Best regards,

Andrew Phelps
Emergency Manager
City of Santa Fe
ajphelps@santafenm.gov
505-955-6537
505-629-3958

November 28th, Planning Team Kickoff Meeting

(Agenda and Minutes available on the Mitigation Website or through the Santa Fe OEM)

City of Santa Fe, New Mexico
Hazard Mitigation Plan

Meeting Agenda

November 28, 2012
9:00 a.m. – 11:00 a.m.

Location: 120 Federal Pl. South, 3rd Floor Conference Room

Type of Meeting: Hazard Mitigation Planning Team Kickoff Meeting

Meeting Facilitators:
Brian Fields, VP & COO B-Sting Ventures, LLC
Lora Sedore, EM Specialist, B-Sting Ventures, LLC

9:00 a.m. – 9:05 a.m. Introductions

9:05 a.m. – 10:30 a.m. Hazard Mitigation Plan Update Overview by Brian Fields

- Discuss Committee Role in Developing Mission Statement, Goals and Objectives
- Discuss Conducting a Natural Hazard Assessment
- Discuss Committee Role in identifying Mitigation Actions
- Discuss Updating Mitigation Website
- Identify and Profile Hazards
- Identify Critical Facilities
- Discuss Inventory Assets – Potential Loss from Natural Disasters
- Discuss Estimate Losses From Natural Disasters
- Discuss Next Meeting and Identify Stakeholders and SMEs

10:30 a.m. – 10:45 a.m. Open Forum for Comments and Questions

10:45 a.m. – 11:00 a.m. Closing Remarks / Next Meetings

- Next Meeting: December 10th, 2012

11:00 a.m. Adjournment

Date/ Location
November 28, 2012
9:00 a.m. – 11:00 a.m.
120 Federal Pl. South, 3rd Floor Conference Room
Santa Fe, NM

Welcome

Mr. Phelps, City of Santa Fe Emergency Manager, opened the meeting with a brief overview of what the project is and introduced the contractor, B-Sting Ventures, LLC, who has been secured update the City's current Hazard Mitigation Plan (HMP).

Introductions

Everyone in attendance provided a brief introduction of who they are and the agency they represent. A copy of the sign in sheet is located at the end of this document.

Planning Team Discussion

The agenda introduced for the meeting included the following topics:

- Discuss Committee Role in Developing Mission Statement, Goals and Objectives
- Discuss Conducting a Natural Hazard Assessment
- Discuss Committee Role in identifying Mitigation Actions
- Discuss Updating Mitigation Website
- Identify and Profile Hazards
- Identify Critical Facilities
- Discuss Inventory Assets – Potential Loss from Natural Disasters
- Discuss Estimate Losses From Natural Disasters
- Discuss Next Meeting and Identify Stakeholders and SMEs

Mr. Fields provided a briefing to the group on the numerous agenda topics related to the plan update and the processes for the future. As agenda topics were identified the following discussions that took place:

- Can we integrate climate change? There may be a way to look at trending when looking at the increase in certain types of disasters as they apply to weather. Further discussions with the State Hazard Mitigation Officer (SHMO) and Climate Change Team will occur in the upcoming months to discuss this being include in the HMP.
- Can we integrate the current Sustainable Santa Fe planning? We can do this and will work this effort in the upcoming months.

- Can we look at solar flares (Space Weather Events)? It's unknown at this time how we can include. Will coordinate idea with the SHMO and determine the best approach. The effects of solar flares may be addressed in other hazards.
- Flood plain mapping has just been completed – however it is not finalized and may need additional studies –this plan can recommend those studies
- Do we consider public critical facilities? Yes if they will directly affect the health and wellbeing of the citizens of Santa Fe- i.e.; hospitals, private power companies, etc
- What documents can we consider incorporating into the update of the HMP? The plan will use information already acquired- i.e.; previous DMP, CWPP, Comprehensive Plan etc.
- Can we include such things as man-made impacts? We can look at assessing these types of hazards. Suggest that we coordinate this effort with the SHMO to determine best approach with the FEMA reviewers.
- What type of funding can we receive after we update the HMP? The mitigation plan may be a conduit to other monies available from FEMA and/or the information gathered can be used to request other funding- i.e.; purpose/needs statement for money from the City Council/state/other federal sources.
- How will the project be managed? The Emergency Manager is the project director for the HMP update. The contractor will lead efforts to gather data for the update and follow the highly suggested FEMA process for updating HMPs. As we go through the process we must include the public in the planning process. This will be a coordinated effort in planning with the contractor and city Emergency Manager. The contractor, with assistance from the Emergency Manager, will gather the information from identified stakeholders and integrate it into the HMP.
- Mr. Fields identified that we need the help of each agency to update data currently in the HMP. We'll be reaching out to those agencies/departments to help provide further detail to those hazards currently identified in the city HMP.

HMP Update process

- Proposed schedule: Mr. Fields provided a schedule overview and the process towards updating the plan. This will be flexible as to meet the schedules of city staff requirements.
- Input we will be looking for over the next few months include:
  - Goals; review, comment and ranking
  - Hazard Identification; review, comment and ranking
  - Risk Analysis; review, comment and ranking
  - Capability; review, comment and ranking
  - Mitigation Actions; review, comment and ranking

Schedule next meeting

- Mr. Fields identified the next meeting is scheduled for December 10, 2012. This meeting will be the large kickoff meeting that will bring all stakeholders to the meeting for over and discussion on what will take place over the next few months.

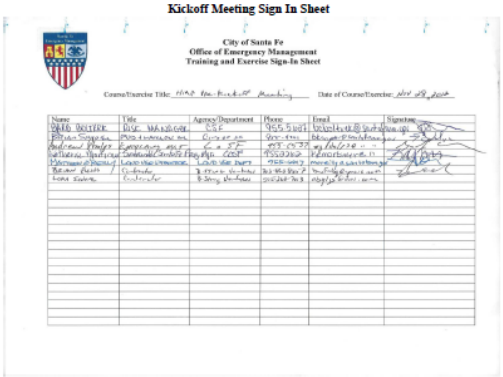
The Kickoff Meeting adjured at 11:00 am. Additional questions or comments can be directed to the following:

Andrew Phelps – Emergency Manager
City of Santa Fe, NM
aphelps@santafenm.gov
505-629-3958 cell
505-955-6537 office

Brian W. Fields – Project Director
B-Sting Ventures (BSV) LLC
703-863-8857 mobile
bwfabq@gmail.com

Lora Sedore – Project Support
B-Sting Ventures (BSV) LLC
505-263-7013
Abqlis1@aol.com

Kickoff Meeting Sign In Sheet


City of Santa Fe
Office of Emergency Management
Training and Exercise Sign-In Sheet

Appendix B – Hazard Assessment Forms

Table 40: Hazard Mitigation Assessment Form

City of Santa Fe Natural Hazards Analysis/Prioritization

Name	Agency/Organization	Phone/Email

1. Hazard Risk Analysis: Rate the Known Hazards in the State of New Mexico. Use the following steps:

a. Identify Probability/Frequency using the chart below:

No	0	Has not occurred
Nuisance	1	Occurs less than once every 10 years or more
Medium	2	Occurs less than once every 5 to 10 years
High	3	Occurs once every year or up to once every five years

b. Identify the Magnitude/Severity using the chart below:

No	0	• Has not Occurred
Nuisance	1	• Negligible property damages (less than 5% of all buildings and infrastructure) • Negligible loss of quality of life • Local emergency response capability is sufficient to manage the hazard
Medium	2	• Moderate property damages (15% to 50% of all buildings and infrastructure) • Some loss of quality of life • Emergency response capability, economic and geographic effects of the hazard are of sufficient magnitude to involve one or more counties
High	3	• Property damages to greater than 50% of all buildings and infrastructure • Significant loss of quality of life • Emergency response capability, economic and geographic effects of the hazard are of sufficient magnitude to require federal assistance

c. Identify the Risk (Duration of loss of critical facilities and services) using the chart below:

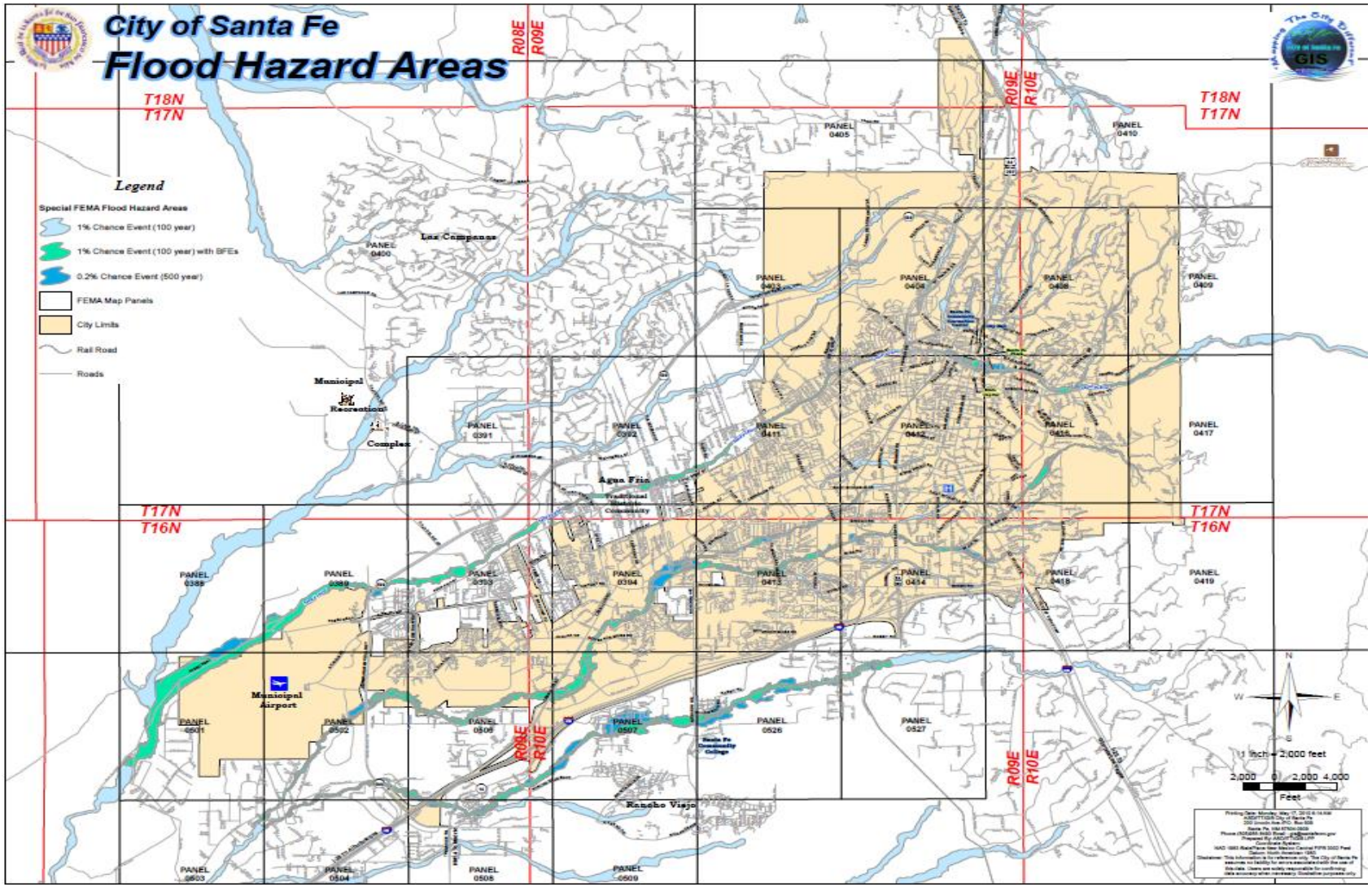
No	0	Has not occurred
Nuisance	1	Loss of critical facilities and services for up to one week
Medium	2	Loss of critical facilities and services from one week to three weeks
High	3	Loss of critical facilities and services for more than three weeks

Natural Hazards	Probability / Frequency	Magnitude / Severity	Risk
Thunderstorm			
Tornado			
High Wind			
Winter Storm			
Extreme Heat			
Wildland / Urban Interface Fires			
Earthquake			
Landslide			
Land Subsidence			
Expansive Soil			
Volcanoes			
Floods			
Dam Failure			
Drought			

Table 41: Mitigation Planning Team Final Hazard Assessment

Natural Hazards	Hazard Priority	Probability / Frequency				Magnitude / Severity				Risk			
		High	Med	Nuisance	No	High	Med	Nuisance	No	High	Med	Nuisance	No
Severe Weather (Includes High Wind, Winter Storms and Thunderstorms and Extreme Heat)	1	33	3	2	-	2	10	19	-	1	4	33	-
Drought	2	31	4	4	-	5	23	11	-	10	9	18	-
Wildland / Urban Interface Fires	3	20	7	13	-	9	18	11	-	8	16	15	-
Floods	4	11	10	15	-	5	11	20	-	1	10	25	-
Human Caused Hazards	5	9	15	11	-	7	12	16	-	4	12	17	-
Space Weather	6	2	7	19	-	-	4	24	-	1	3	24	-
Earthquake	7	3	6	-	29	-	9	-	28	5	8	-	24
Expansive Soil	8	2	7	-	28	-	4	-	30	1	2	-	31
Land Subsidence	9	2	4	-	30	1	2	-	32	2	2	-	31
Landslide	10	1	5	-	30	-	7	-	29	2	3	-	31
Tornado	11	1	3	-	32	1	9	26	-	4	3	28	-
Volcanoes	12	-	-	-	8	1	-	1	4	3	2	-	31
Dam Failure	13	-	-	-	37	7	7	-	21	11	6	-	18

Appendix C – City of Santa Fe Flood Plain Maps



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Appendix D – STAPLE+E Forms

Table 42: STAPLE+E Prioritization Form

Hazard Mitigation Goals, Objectives & Actions													
Project Data				STAPLE+E								Agency or Dept. Responsible
Hazard	Goal	Objective	Actions	Social	Technical	Admin	Political	Legal	Economic	Environ.	Total	
Wildfire	Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure due to wildfires.	Reduce the exposure to critical facilities in high or extreme wildfire hazard areas.	Identify, create and maintain defensible space around critical facilities located in high or extreme wildfire hazard areas, such as schools, fire stations, etc.									FD
			Conduct assessment of City-owned critical facilities vulnerable to wildfire and replace roofs with fire resistant materials.									FD
			Ensure compliance with the recently adopted wildland-urban interface ordinance by hiring additional staff to do on-site inspections and enforcement.									FD
		Reduce the exposure of residential structures to wildfires	Reduce fuel loads and create defensible space around structures in the wildland - urban interface areas. • Expand Chipping Program • Expand Fuel Thinning Program									FD
			Develop dependable sources of water for fire suppression in all residential areas of the City.									FD Water Div
		Educate the public in defensible space and other preventative measures to minimize wildfire risk	Make educational materials available through the Land Use Department to inform citizens about Best Management Practices (BMPs) for defensible Space.									FD Land Use
			Create Firewise Communities in high risk subdivisions.									FD
			Educate the public on evacuation routes and evacuation procedures. Build upon existing evacuation routes.									FD OEM
			Educate the public on Wildland-Urban Interface (WUI) best practices through demonstration site and educational brochures.									FD
			Expand delivery of "Ready, Set, Go!" program.									FD

Hazard Mitigation Goals, Objectives & Actions													
Project Data				STAPLE+E								Agency or Dept. Responsible
Hazard	Goal	Objective	Actions	Social	Technical	Admin	Political	Legal	Economic	Environ.	Total	
Flooding	Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure due to flooding.	Reduce exposure of structures and roads to flooding	Conduct flash flooding hydrology studies in flood prone areas of the city.									Land Use
			Enhance and/or develop drainage in flood prone areas of the city.									Land Use
			Protect wells from actual and potential sources of contamination during flooding.									Land Use Water Div
			Continue to meet the compliance requirements outlined in the NFIP.									Land Use
			Conduct studies and update floodplain and Floodway maps in the City of Santa Fe.									Land Use
		Build and support local capacity to enable the public to prepare for, respond to and recover from disasters	Expand and disseminate GIS and other hazard information on the internet.									GIS
			Develop, support and fund Citizen Corps Programs, to include Community Emergency Response Teams (CERT) that also includes a mitigation component.									OEM
			Create a virtual and physical library that contains all technical studies, particularly natural resources.									Land Use
			Develop and Flood Hazard Education/Outreach Plan.									Land Use OEM
			Work with city officials to increase awareness among property owners including information mailings to property owners in the 100-year floodplain; and sponsoring a series of workshops about costs and benefits of acquiring and maintaining flood insurance coverage for property owners in the 100-year floodplain.									Land Use

Hazard Mitigation Goals, Objectives & Actions												
Project Data				STAPLE+E								Agency or Dept. Responsible
Hazard	Goal	Objective	Actions	Social	Technical	Admin	Political	Legal	Economic	Environ.	Total	
Severe Weather Severe (Thunderstorms, high wind, extreme heat)	Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure due to severe weather.	Develop a comprehensive approach to reducing the possibility of damage and loss of function to identified vulnerable buildings and critical facilities, due to the effects of severe weather hazards.	Conduct non-technical evaluation process for critical facilities to determine relative severe weather vulnerability and gather information for subsequent refinements of this mitigation plan.									Land Use OEM
		Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, compliance with current building codes, etc.	Complete structure data records in the city's Geographic Information System to allow future revisions of this plan to more easily incorporate information about property values, construction types, etc.									GIS
	Reduce possibility of injury and death due to severe weather.	Increase public awareness of actions to take during all types of severe weather.	Increase number of radios/televisions with warning capabilities in public buildings, parks, and recreational areas to announce alerts from the Emergency Alert System and National Weather Radio.									OEM
			Purchase NOAA radio for public buildings.									OEM
		Increase participation in and number of storm watcher programs throughout City.	Increase number of National Weather Service's SKYWARN on the ground storm spotters; recruit and train additional storm spotters. SKYWARN spotters enhance the National Weather Service's storm detection capabilities by identifying and reporting potentially dangerous weather conditions.									OEM
			Establish city as a *StormReady* City to enhance preparedness for the impacts of severe weather through better planning, education, and awareness.									OEM
		Identify critical facilities and buildings that are vulnerable to severe weather events.	Utilize existing critical facility data records in the Santa Fe City Geographic Information System to target City-Owned structures in need of updating.									GIS Land Use

Hazard Mitigation Goals, Objectives & Actions												
Project Data				STAPLE+E								Agency or Dept. Responsible
Hazard	Goal	Objective	Actions	Social	Technical	Admin	Political	Legal	Economic	Environ.	Total	
			Conduct a survey of all manufactured homes in the City to gather data on location, age, and condition to determine appropriate mitigation action (anchoring structures, relocation, and acquisition).									Land Use
			Determine the number of emergency generators to power essential buildings and seek acquisition.									Facilities
	Reduce possibility of severe damage, injury and death due to High Wind.	Identify critical facilities and buildings that are vulnerable to high winds.	Utilize existing critical facility data records in the city's Geographic Information System to target structures in need of updating.									GIS Land Use
			Conduct a survey of all manufactured homes in the City to gather data on location, age, and condition to determine appropriate mitigation action (anchoring structures, relocation, and acquisition).									Land Use
	Reduce possibility of injury and death due to Extreme Heat.	Increase public awareness of actions to take during extreme heat events.	Review existing extreme heat emergency response plans for enhancement opportunities									OEM
			Work with social support agencies, homeowners associations and general public to develop and implement monitoring and warning systems focused on vulnerable populations and provision of adequate shelter facilities during heat emergencies.									OEM
Drought	Reduce possibility of damage and loss due to drought.	Educate the population on damage and loss due to drought	Publish and distribute educational materials on water conservation techniques and drought management strategies.									Water Div
			Conduct public meetings with local and visiting subject matter experts to educate the public on how to decrease their risk to drought.									Water Div OEM

Hazard Mitigation Goals, Objectives & Actions												
Project Data				STAPLE+E								Agency or Dept. Responsible
Hazard	Goal	Objective	Actions	Social	Technical	Admin	Political	Legal	Economic	Environ.	Total	
			Encourage citizens to implement water conservation measures by distributing water saving kits which include replacement shower heads, flow restrictions and educational pamphlets which describe water saving techniques. Also encourage conservation by offering rebates for ultra-low-flow toilets.									Water Div
			Implement water metering and leak detection programs followed by water main repair/replacement to reduce losses.									Water Div
		Continue efforts to encourage residents to use water-saving landscaping techniques.	Fund program to meter domestic wells.									Water Div
			Enforce existing zoning and building regulations on water use.									Water Div Land Use
			Expand City of Santa Fe water conservation incentive program.									Water Div
			Implement projects to use treated effluent for non potable uses.									Water Div
Human Caused Hazards (including Hazard Material Releases, Nuclear Facility Accidents and Terrorism)	Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure due to human-caused hazards.	Develop a comprehensive approach to reducing the possibility of injury and loss of life for residents and occupants of existing structures and critical facilities with the highest relative vulnerability to the effects of hazardous material releases from discrete locations.	The Mitigation Planning Team should work with facility owners and operators identified in Section One of this plan as having the greatest potential impact (based on population in the immediate vicinity) to ensure: • Facilities are in compliance with all relevant local, state and federal requirements; • Neighboring property owners understand the potential extent of the risk; and • Alert and warning systems are appropriate to the situation. Pursue the installation of warning systems around hazardous material facilities if it is determined that existing warning systems are inadequate for the purposes of alerting neighboring property owners.									OEM

Hazard Mitigation Goals, Objectives & Actions												
Project Data				STAPLE+E								Agency or Dept. Responsible
Hazard	Goal	Objective	Actions	Social	Technical	Admin	Political	Legal	Economic	Environ.	Total	
		Protect the public water system and other critical facilities from contamination from hazardous materials incidents	Assess need to and methods to harden critical facilities against the effects of human-made hazards, e.g., the accidental or intentional release of chemical, biological, or radioactive material; the accidental or intentional detonation of explosives; or acts of random violence or terrorism.									OEM
		Protect the general population and special populations from hazardous materials incidents.	Maintain and update equipment used to respond to hazardous materials incidents.									FD
			Ensure the Emergency Operations Plan meets or exceeds current state and federal hazardous materials emergency planning requirements.									OEM FD
		Improve communications with facilities housing special populations, such as nursing homes, senior centers, and daycare centers.	Provide city-wide emergency communication systems that are not dependent on local telephone and electrical services.									OEM PD RECC
		Increase awareness of hazards and actions to take during an emergency.	The Mitigation Planning Team should seek opportunities to inform individuals and business owners regarding recommendations for how to prepare for hazardous material releases. The recommendations will advise taking some of the same actions to prepare for earthquakes, floods, and fires, i.e., store a multi-day supply of food and water, make sure flashlights, portable radios, and spare batteries are on hand; and identify out-of-town contacts and a place to reunite if separated from family members. All residents can be better prepared by becoming more aware of surroundings and reporting suspicious activity to local officials.									OEM

Hazard Mitigation Goals, Objectives & Actions												
Project Data				STAPLE+E								Agency or Dept. Responsible
Hazard	Goal	Objective	Actions	Social	Technical	Admin	Political	Legal	Economic	Environ.	Total	
Space Weather	Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure due to space weather.	Protect the communication systems and other critical facilities from space weather events.	Assess the need and ways to harden critical facilities/infrastructure against the effects of space weather events.									OEM RECC ARES
		Increase awareness of the impact of space weather events on the community.	Conduct Public education and awareness program.									OEM ARES
Public Awareness	Promote disaster-resistant development.	Encourage and facilitate the development or revision of comprehensive plans and zoning ordinances to limit development in high hazard areas and improve the ability to identify vulnerable structures.	Distribute and promote the inclusion of the vulnerability analysis information as part of periodic plan review and revisions at the City level.									OEM
			Utilize a GIS for identifying "sensitive area" properties in the City.									GIS
		Encourage and facilitate the adoption of building codes that provide protection for new construction and substantial renovations from the effects of identified hazards.	Promote adoption of the Wildland-Urban Interface Code by the city.									FD Land Use
		Provide adequate and consistent enforcement of ordinances and codes within and between jurisdictions.	Work with the State, County and municipal building inspectors to consistently enforce the building code from jurisdiction to jurisdiction.									Land Use
	Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.	Provide public education to increase awareness of hazards and opportunities for mitigation.	Identify and publicize success stories as part of an overall consistent public relations program.									OEM
			Develop opportunities for community participation in emergency preparedness programs, to include citizen advisory committees and Citizen Corps Programs.									OEM

Hazard Mitigation Goals, Objectives & Actions												
Project Data				STAPLE+E								Agency or Dept. Responsible
Hazard	Goal	Objective	Actions	Social	Technical	Admin	Political	Legal	Economic	Environ.	Total	
		Promote partnerships to continue the development of a citywide approach to identifying and implementing mitigation actions.	Convene regular meetings with the Mitigation Planning Team to discuss issues and progress related to the implementation of the plan.									OEM
			Promote partnerships among the city departments, non-profit organizations, and the private sector to develop a citywide approach to mitigation activities.									OEM
			Incorporate hazard mitigation concepts into all applicable city operations.									OEM

Table 43: Projects Final Prioritization from Hazard Mitigation Team

Hazard Mitigation Goals, Objectives & Actions				
Project Data				STAPLE+E
Hazard	Goal	Objective	Actions	Total
Wildfire	Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure due to wildfires.	Reduce the exposure to critical facilities in high or extreme wildfire hazard areas.	Identify, create and maintain defensible space around critical facilities located in high or extreme wildfire hazard areas, such as schools, fire stations, etc.	111
			Conduct assessment of City-owned critical facilities vulnerable to wildfire and replace roofs with fire resistant materials.	83
			Ensure compliance with the recently adopted wildland-urban interface ordinance by hiring additional staff to do on-site inspections and enforcement.	91
		Reduce the exposure of residential structures to wildfires	Reduce fuel loads and create defensible space around structures in the wildland - urban interface areas. • Expand Chipping Program • Expand Fuel Thinning Program	113
			Develop dependable sources of water for fire suppression in all residential areas of the City.	99
		Educate the public in defensible space and other preventative measures to minimize wildfire risk	Make educational materials available through the Land Use Department to inform citizens about Best Management Practices (BMPs) for defensible Space.	104
			Create Firewise Communities in high risk subdivisions.	76
			Educate the public on evacuation routes and evacuation procedures. Build upon existing evacuation routes.	80
			Educate the public on Wildland-Urban Interface (WUI) best practices through demonstration site and educational brochures.	84
			Expand delivery of “Ready, Set, Go!” program.	99
Flooding	Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure due to flooding.	Reduce exposure of structures and roads to flooding	Conduct flash flooding hydrology studies in flood prone areas of the city.	90
			Enhance and/or develop drainage in flood prone areas of the city.	103
			Protect wells from actual and potential sources of contamination during flooding.	105
			Continue to meet the compliance requirements outlined in the NFIP.	74

Hazard Mitigation Goals, Objectives & Actions				
Project Data				STAPLE+E
Hazard	Goal	Objective	Actions	Total
			Conduct studies and update floodplain and Floodway maps in the City of Santa Fe.	102
		Build and support local capacity to enable the public to prepare for, respond to and recover from disasters	Expand and disseminate GIS and other hazard information on the internet.	70
			Develop, support and fund Citizen Corps Programs, to include Community Emergency Response Teams (CERT) that also includes a mitigation component.	100
			Create a virtual and physical library that contains all technical studies, particularly natural resources.	75
			Develop and Flood Hazard Education/Outreach Plan.	92
			Work with city officials to increase awareness among property owners including information mailings to property owners in the 100-year floodplain; and sponsoring a series of workshops about costs and benefits of acquiring and maintaining flood insurance coverage for property owners in the 100-year floodplain.	88
Severe Weather Severe (Thunderstorms, high wind, extreme heat)	Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure due to severe weather.	Develop a comprehensive approach to reducing the possibility of damage and loss of function to identified vulnerable buildings and critical facilities, due to the effects of severe weather hazards.	Conduct non-technical evaluation process for critical facilities to determine relative severe weather vulnerability and gather information for subsequent refinements of this mitigation plan.	112
		Address identified data limitations regarding lack of detailed information about characteristics of individual structures such as construction type, age, condition, compliance with current building codes, etc.	Complete structure data records in the city's Geographic Information System to allow future revisions of this plan to more easily incorporate information about property values, construction types, etc.	93
	Reduce possibility of injury and death due to severe weather.	Increase public awareness of actions to take during all types of severe weather.	Increase number of radios/televisions with warning capabilities in public buildings, parks, and recreational areas to announce alerts from the Emergency Alert System and National Weather Radio.	96
			Purchase NOAA radio for public buildings.	87
		Increase participation in and number of storm watcher programs throughout City.	Increase number of National Weather Service's SKYWARN on the ground storm spotters; recruit and train additional storm spotters. SKYWARN spotters enhance the National Weather Service's storm detection capabilities by identifying and reporting potentially dangerous weather conditions.	87

Hazard Mitigation Goals, Objectives & Actions				
Project Data				STAPLE+E
Hazard	Goal	Objective	Actions	Total
			Establish city as a *StormReady* City to enhance preparedness for the impacts of severe weather through better planning, education, and awareness.	102
		Identify critical facilities and buildings that are vulnerable to severe weather events.	Utilize existing critical facility data records in the Santa Fe City Geographic Information System to target City-Owned structures in need of updating.	88
			Conduct a survey of all manufactured homes in the City to gather data on location, age, and condition to determine appropriate mitigation action (anchoring structures, relocation, and acquisition).	92
			Determine the number of emergency generators to power essential buildings and seek acquisition.	98
	Reduce possibility of severe damage, injury and death due to High Wind.	Identify critical facilities and buildings that are vulnerable to high winds.	Utilize existing critical facility data records in the city's Geographic Information System to target structures in need of updating.	98
			Conduct a survey of all manufactured homes in the City to gather data on location, age, and condition to determine appropriate mitigation action (anchoring structures, relocation, and acquisition).	77
	Reduce possibility of injury and death due to Extreme Heat.	Increase public awareness of actions to take during extreme heat events.	Review existing extreme heat emergency response plans for enhancement opportunities	95
			Work with social support agencies, homeowners associations and general public to develop and implement monitoring and warning systems focused on vulnerable populations and provision of adequate shelter facilities during heat emergencies.	91
Drought	Reduce possibility of damage and loss due to drought.	Educate the population on damage and loss due to drought	Publish and distribute educational materials on water conservation techniques and drought management strategies.	101
			Conduct public meetings with local and visiting subject matter experts to educate the public on how to decrease their risk to drought.	89
			Encourage citizens to implement water conservation measures by distributing water saving kits which include replacement shower heads, flow restrictions and educational pamphlets which describe water saving techniques. Also encourage conservation by offering rebates for ultra-low-flow toilets.	86

Hazard Mitigation Goals, Objectives & Actions				
Project Data				STAPLE+E
Hazard	Goal	Objective	Actions	Total
			Implement water metering and leak detection programs followed by water main repair/replacement to reduce losses.	90
		Continue efforts to encourage residents to use water-saving landscaping techniques.	Fund program to meter domestic wells.	92
			Enforce existing zoning and building regulations on water use.	80
			Expand City of Santa Fe water conservation incentive program.	82
			Implement projects to use treated effluent for non potable uses.	90
Human Caused Hazards (including Hazard Material Releases, Nuclear Facility Accidents and Terrorism)	Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure due to human-caused hazards.	Develop a comprehensive approach to reducing the possibility of injury and loss of life for residents and occupants of existing structures and critical facilities with the highest relative vulnerability to the effects of hazardous material releases from discrete locations.	The Mitigation Planning Team should work with facility owners and operators identified in Section One of this plan as having the greatest potential impact (based on population in the immediate vicinity) to ensure: • Facilities are in compliance with all relevant local, state and federal requirements; • Neighboring property owners understand the potential extent of the risk; and • Alert and warning systems are appropriate to the situation. Pursue the installation of warning systems around hazardous material facilities if it is determined that existing warning systems are inadequate for the purposes of alerting neighboring property owners.	94
		Protect the public water system and other critical facilities from contamination from hazardous materials incidents	Assess need to and methods to harden critical facilities against the effects of human-made hazards, e.g., the accidental or intentional release of chemical, biological, or radioactive material; the accidental or intentional detonation of explosives; or acts of random violence or terrorism.	101
		Protect the general population and special populations from hazardous materials incidents.	Maintain and update equipment used to respond to hazardous materials incidents.	100
			Ensure the Emergency Operations Plan meets or exceeds current state and federal hazardous materials emergency planning requirements.	97
		Improve communications with facilities housing special populations, such as nursing homes, senior centers, and daycare centers.	Provide city-wide emergency communication systems that are not dependent on local telephone and electrical services.	96

Hazard Mitigation Goals, Objectives & Actions				
Project Data				STAPLE+E
Hazard	Goal	Objective	Actions	Total
		Increase awareness of hazards and actions to take during an emergency.	The Mitigation Planning Team should seek opportunities to inform individuals and business owners regarding recommendations for how to prepare for hazardous material releases. The recommendations will advise taking some of the same actions to prepare for earthquakes, floods, and fires, i.e., store a multi-day supply of food and water, make sure flashlights, portable radios, and spare batteries are on hand; and identify out-of-town contacts and a place to reunite if separated from family members. All residents can be better prepared by becoming more aware of surroundings and reporting suspicious activity to local officials.	102
Space Weather	Reduce possibility of damage and loss to existing community assets including structures, critical facilities, and infrastructure due to space weather.	Protect the communication systems and other critical facilities from space weather events.	Assess the need and ways to harden critical facilities/infrastructure against the effects of space weather events.	110
		Increase awareness of the impact of space weather events on the community.	Conduct Public education and awareness program.	101
Public Awareness	Promote disaster-resistant development.	Encourage and facilitate the development or revision of comprehensive plans and zoning ordinances to limit development in high hazard areas and improve the ability to identify vulnerable structures.	Distribute and promote the inclusion of the vulnerability analysis information as part of periodic plan review and revisions at the City level.	91
			Utilize a GIS for identifying “sensitive area” properties in the City.	71
		Provide adequate and consistent enforcement of ordinances and codes within and between jurisdictions.	Work with the State, County and municipal building inspectors to consistently enforce the building code from jurisdiction to jurisdiction.	92
	Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.	Provide public education to increase awareness of hazards and opportunities for mitigation.	Identify and publicize success stories as part of an overall consistent public relations program.	73
			Develop opportunities for community participation in emergency preparedness programs, to include citizen advisory committees and Citizen Corps Programs.	83
		Promote partnerships to continue the development of a citywide approach to identifying and implementing mitigation actions.	Convene regular meetings with the Mitigation Planning Team to discuss issues and progress related to the implementation of the plan.	93
			Promote partnerships among the city departments, non-profit organizations, and the private sector to develop a citywide approach to mitigation activities.	94

Hazard Mitigation Goals, Objectives & Actions				
Project Data				STAPLE+E
Hazard	Goal	Objective	Actions	Total
			Incorporate hazard mitigation concepts into all applicable city operations.	99

Appendix E – References

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